

REDEFINING CUREPE JUNCTION BASED ON USER PERCEPTION

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ABSTRACT

Redefining Curepe Junction based on user perception.

Deena D. Dass

Development at transportation hubs throughout Trinidad and Tobago utilises antiquated strategies to resolve complex transportation engineering and urban design elements (TEUD), neglecting the input from the end-users. The objectives of this research were accomplished by utilising the user perception to identify the problematic TEUD elements of Curepe Junction, developing the design guidelines and assessing the potential impacts of the redesign.

In pursuance of designing a successful junction, the leading successful space concepts were explored, i.e. Complete Streets, Context Sensitive Solution and Portals to Places. Three core elements were identified upon connecting these concepts: the people, the furnishings, and the network. While assessing these elements in the context of Curepe Junction, 125 hub users deemed all the elements of this auto-centric junction as below acceptable levels, identifying the most problematic elements as:

1. Accessibility for the elderly and people with disabilities
2. Accessibility of transit information
3. Convenient and comfortable seating accommodations

Upon redesigning the junction on the advice of the hub users and guided by literature utilising successful space concepts, the redesign generated a higher hub user satisfaction rate than the current design. This paradigm shift of redesigning for the people, by the people, illustrated that successful spaces thrive on the involvement of the end-users, ensuring the development of sustainable and practical design guidelines. Thus, concluding that the success of a space is directly proportional to the extent of the user involvement.

Keywords: Transportation Engineering; Urban Design; Complete Street; The Place Diagram; Design Guidelines; Trinidad and Tobago.

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LIST OF ACRONYMS

ADA	Americans with Disabilities Act
APS	Accessible Pedestrian Signals
BTP	Boston Department of Transportation
CAPA	Crime and Problem Analysis
CDG	Curepe Design Guidelines
CJ	Curepe Junction
CSS	Context Sensitive Solution
CTM	Curepe Transit Mall
CTP	Calgary Transportation Department
DG	Design Guidelines
EMR	Eastern Main Road
ISCO	International Standard Classification of Occupations
ITE	Institute of Transportation Engineers
km/h	Kilometres Per Hour
m	Metre/s
MOWI	Ministry of Works and Infrastructure
NACTO	National Association of City Transportation Officials
PBR	Priority Bus Route
PPS	Project for Public Spaces
PTIGTT	Public Transport Improvement Group of Trinidad & Tobago
PTSC	Public Transport Service Corporation
RQ	Research Question
SMR	Southern Main Road
SSI	Semi-Structured Interview/s
TCPD	Town and Country Planning Division
TE	Transportation Engineering
TEUD	Transportation Engineering and Urban Design
TTPS	Trinidad and Tobago Police Service
UD	Urban Design
WAT	Walkability Assessment Toolkit

CHAPTER 1

INTRODUCTION

1.1 Background

Traditionally, spaces centred around landmark transit services attract heavy vehicular and foot traffic. In Trinidad and Tobago, such spaces are predominantly found around transit malls, facilitating transfers between the Priority Bus Route (PBR), the main public transportation corridor of Trinidad and Tobago, and the main roads, connecting the hub to the surrounding communities. Throughout the years, such bustling hubs have attracted thousands of captive transit users, locals, and foreigners to the array of facilities surrounding the area daily, especially Curepe Junction.

Over the last decade, improvements to Curepe Junction have been stagnant. The most recent improvements were upgrades to the pedestrian crosswalks in 2016 (Loop 2016) and the transit mall and road markings repainting in 2019. Policymakers of Trinidad and Tobago traditionally address the need for improvements in an ad hoc manner, often neglecting the needs beyond the transportation engineering discipline. Despite minor improvements, Curepe Junction remains a dangerous and hostile environment, described by Professor Ramesh Deosaran as a “crazy Curepe corner” due to the “unchecked craziness witnessed daily” (Deosaran 2018, para. 10).

The ongoing issues experienced by users suggest that a multidisciplinary approach can achieve improvements throughout such spaces. Thus, the purpose of this research is the use of an interdisciplinary approach to outline a framework for redeveloping a dysfunctional public space surrounding such a significant transit hub.

1.2 Problem Statement

The research problem emerged from continued observation of the sub-optimal and often dangerous conditions experienced at transportation hubs throughout Trinidad and Tobago, and the lack of a multidisciplinary approach to treat these multifaceted spaces. Spaces such as Curepe Junction present issues beyond the boundaries of the transportation engineering discipline and should be addressed accordingly.

This research aims to identify and address the underlying problematic element or elements within the transportation engineering and urban design (TEUD) structure of Curepe Junction. Design guidelines will be developed to resolve the problematic elements identified by the hub users. The guidelines will eliminate the existing discord within the hub and consequently improve the overall functionality of Curepe Junction for all its users. This research project will contribute to the existing research on TEUD knowledge and produce innovative philosophies for Trinidad and Tobago to improve its archaic and dysfunctional transit hubs.

1.3 Aim

This project aims to develop and evaluate the potential impacts of design guidelines for the problematic transportation engineering and urban design elements within Curepe Junction based on user perception.

1.4 Objectives

The research objectives are as follows:

1. Identify the problematic TEUD elements at Curepe Junction.
2. Develop TEUD guidelines to treat the problematic elements identified.
3. Assess the potential impacts of implementing the TEUD guidelines.

1.5 Key Research Question

The question driving this research is:

1. What are the problematic TEUD elements perceived by the people of Curepe Junction?

1.6 Scope and Limitations

This research aims to identify transportation engineering and urban design elements of a space, present questions about these elements to the people of Curepe and address the dysfunctional elements using an integrated transportation engineering and urban design framework.

Due to the time constraints of the project, the data collected was limited to the immediate surroundings of Curepe Junction illustrated in Figure 1.1. The surveys focus on pedestrians, as opposed to persons driving past the hub. Even though the inclusion of the motorists' perspectives can be beneficial, the resources to distinguish and interview such hub users did not align with the timeline of the project.

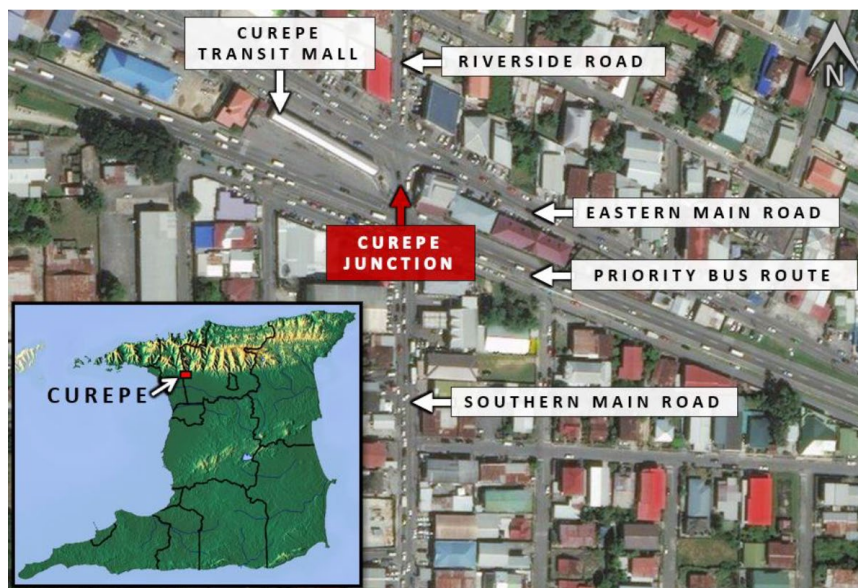


Figure 1.1: Research site area of Curepe Junction

Source: Adapted from Google Earth (2021)

CHAPTER 2

LITERATURE REVIEW

The chapter explores and reviews the existing knowledge, ranging from government policies to academic research. This chapter also identifies the gaps in the existing knowledge related to Trinidad and Tobago.

The basis of transportation engineering encompasses moving people and goods as safely, efficiently and conveniently as possible (Garber and Hoel 2020). Urban Design, an interdisciplinary field of architecture, urban planning and transportation, is described as the art of city building (Bahrainy and Bakhtiar 2016). A well-integrated Transportation Engineering and Urban Design (TEUD) structure should merge these disciplines to enhance the movement and connectivity of the people with the space. The literature reviewed is detailed below into the following five subsections:

1. A Quality Place
2. TEUD Elements
3. Existing Design Guidelines
4. Existing Methodologies and Analysis
5. Gaps in Current TEUD Research

2.1 A Quality Place

2.1.1 Characteristics of a Successful Place

The words “place” and “space” are used interchangeably throughout this paper. It is understood they are distinctly different in the urban design field; however, for the purposes of this research, these words refer to a generic developed area.

Project for Public Spaces (PPS) consist of a cross-disciplinary team dedicated to the placemaking concept. The placemaking concept creates a place of quality as visualised by the users based on their observations, experiences and aspirations (Wyckoff 2014). With this concept in mind, PPS developed “The Place Diagram” by evaluating thousands of public spaces worldwide by looking at, listening to, and asking questions of the people who live, work, and play in a particular space to discover their needs and envisions. PPS (2016) concluded that successful places share four key attributes:

1. They foster positive social interactions between strangers or friends.
2. They encourage users to engage in activities.
3. The users feel comfortable, and the space projects a good image.
4. They are accessible and well connected to the surrounding area.

Even though PPS findings are recognised worldwide, Nouri and Costa (2017) argues that the diagram must be modified to accommodate the ever-growing importance of pedestrian comfort.

The Place Diagram tool, shown in Figure 2.1, assesses whether a place can be deemed successful or not. The tool features three layers: the core layer; the intangibles; and the measurables. The core layer considers the four aforementioned key attributes focusing on a specified place, while the two outer circles further define these four key elements.

The intangible layer assesses the place based on first-hand observations, such as:

- For sociability: is the place welcoming?
- For uses and activities: are the activities fun?
- For comfort and image: is the place clean and safe?
- For access and linkages: is the place accessible, and are signs readable?

The outer measurable layer requires quantitative research to gather data on features such as: demographics, land use patterns, crime statistics and traffic data.

The PPS allows researchers the adaptability to effortlessly implement this tool into their research when evaluating the success of the place. Thus, with some adjustments, The Place Diagram will be used as the foundation for assessing Curepe Junction.

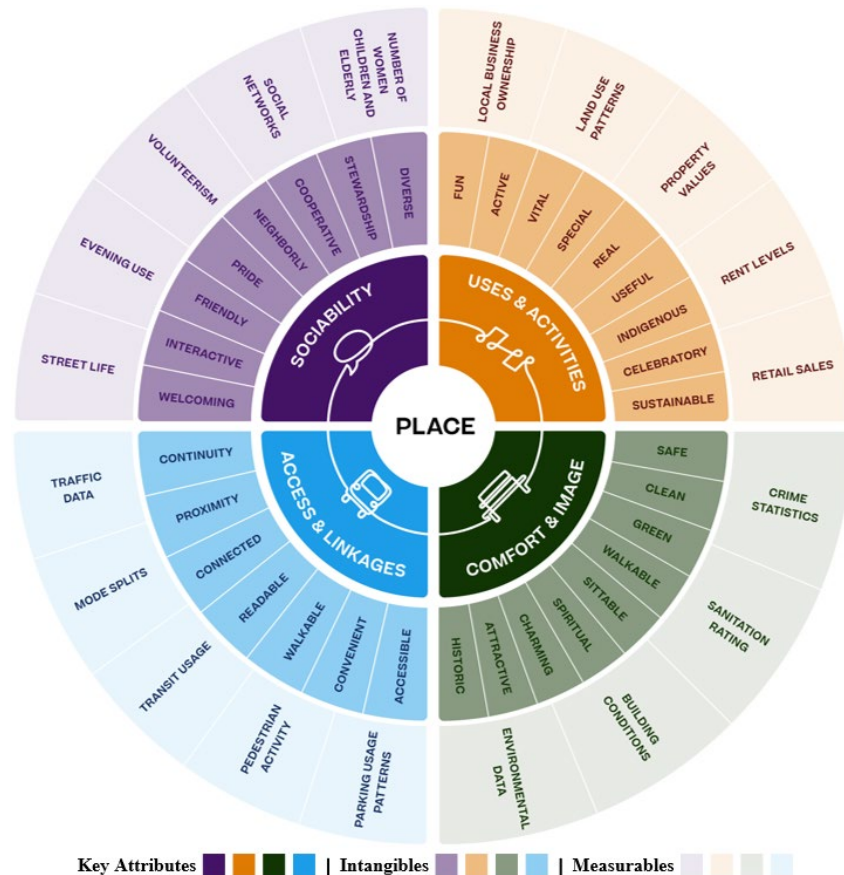


Figure 2.1: The place diagram

Source: Project for Public Spaces (2021b)

2.1.2 Complete Street

Streets play a multidimensional role in the vitality of their surrounding urban setting and must adapt to accommodate its ever-evolving stages (NACTO 2013). The “Complete Street” philosophy ensures that regardless of the adaptations to the street, the design accommodates users of all ages and abilities travelling by all modes (Pande and Brian 2016). Traditionally, transportation planning revolved around designing for drivers, which had undesirable and unintended outcomes such

as degraded walking conditions, automobile dependence and urban sprawl (Litman 2015). The Complete Street approach challenges traditional automobile-centric designs by thinking beyond the driver and prioritising all the people, regardless of their mode of transport, and in doing so, aims to make places more user-friendly, well connected, and sustainable.

The design of a complete street is specific to its context, and therefore, the guidelines vary from street to street. Unlike The Place Diagram, there is no standardised toolkit for assessing the completeness of the street but rather tailored design guidelines that are context-sensitive (Kingsbury, Lowry, and Dixon 2011; Hui et al. 2017; Sharpin, Welle Ben, and Luke Nikita 2017). However, there is a pattern of elements that emerges in complete street designs that accommodate for accessibility by differently-abled and pedestrians; bus lanes; street furniture; landscaping and active streetscape; lighting and signage; improved sidewalks, shelters and parking facilities (Litman 2015; U.S. Department of Transportation 2015; Sharpin, Welle Ben, and Luke Nikita 2017). In addition, one can draw similarities with key PPS elements for a successful place: sociability, access and linkage, and comfort and image. Both are intended to guide the creation of places that encourage users to utilise the space, creating an enriched people-centric experience.

2.2 TEUD Elements

As previously inferred, the successful place concept by PPS contains features of the complete street concept. The trend in approaching these two concepts focuses on the users, transport modes, and space connecting and surrounding the two. The disciplines that incorporate these elements are transportation engineering and urban design.

2.2.1 Elements of Transportation Engineering

According to Rodrigue (2020), the four core components of transportation are:

1. **Modes** representing the form that accommodates movement.
2. **Infrastructure** representing the physical structures that support the modes.
3. **Networks** representing the connectivity between the infrastructures.
4. **Flows** representing the movement between the networks.

On the other hand, Mathew and Rao (2007) consider the four major components of transportation engineering to be:

1. **Pavement Analysis and Design** representing the physical structure of the road design.
2. **Geometric Design** representing the physical layout of the transportation space.
3. **Transportation Planning** representing a collaborative process that designs for the current and future transportation network needs.
4. **Traffic Engineering** representing the design and operation of the flow of modes within a network.

Moreover, elements of transportation engineering can be viewed from different perspectives as they relate to what aspects make up the structure, according to Rodrigue (2020), or what disciplines govern the theory behind specific aspects of the system, as stated by Mathew and Rao (2007). Therefore, concerning this study, a deeper look into elements of public transportation will now be considered.

Researchers appear to focus on isolating, analysing and improving aspects of a transportation space such as accessibility to all and compliance with ADA recommendations; vehicular density and flow; corridor design; street furnishings such as improved lighting and seating accommodations; multimodal system efficiency and pedestrian connectivity to list a few (Rivas 2009; Atallah 2011; Ing 2016; Martinucci 2016; Abouakalloub 2017). However, even though these

researchers addressed transportation elements, they mainly generalised their observations exclusively qualitatively.

Ing (2016) is the only researcher within the reviewed literature who accounted for more in-depth quantitative considerations such as the Average Daily Traffic volumes and Walkability Score for the area. It is pertinent to note that the above-mentioned researchers selected elements in conformity with their need to satisfy the end-users based on the feedback from their interviews.

DDS Wireless International Inc. (2018) suggests that a leading transportation system should include: multimodal options, easily accessible information, fast and frequent transit services, and an interesting and comfortable experience. These attributes were common amongst the literature while developing the design guidelines.

The research cited above lacked an in-depth transportation assessment of the relevant study areas and primarily addressed dysfunctional transportation elements based on surface observations with stopgap solutions. For example, Rivas (2009) addresses the heavy traffic experienced by the interviewees by re-routing the traffic and implementing time restrictions. Rivas (2009), Atallah (2011), Martinucci (2016) and Abouakalloub (2017) proposed temporary solutions based on the survey responses and not quantifiable data/ field tests. The credibility of this approach is discussed further in Section 2.4.3 Research Validity.

Different categories of transportation engineering elements all bear similarities and stem from three core elements: the unit of carriage; the right of way; and the terminal. Translating this to Curepe Junction, these are, respectively: walking and all motorised vehicles; the junction's roads; and the Curepe Transit Mall (CTM).

2.2.2 Elements of Urban Design

Elements of urban design take the definition of transportation further by exploring the space through which people and goods move. Urban design is considered on a macro-level, which addresses urban form and micro-level, which addresses the pedestrian experience through the space (ASBEC 2015).

Urban form is an umbrella term used to describe a space based on its physical characteristics, such as size, configuration, and nonphysical aspects, such as density. Dempsey et al. (2010) deduce the following five elements of urban form based on their influence on human behaviour:

1. ***Density*** measures people living or passing through the space and is used as a tool to measure the viability of a development. However, Dempsey et al. (2010) note that density measurements are perceptive based on the goal of the researcher and that the point of a high or too high of density is unclear.
2. ***Land Use*** classifies the development types, i.e. residential, commercial, and mixed. Mixed being the most desirable, promoting a range of activities in a space, encouraging social interaction and influencing walkability (Healthy Spaces and Places 2011).
3. ***Accessibility and Transport Infrastructure*** determines the ease of connectivity throughout a space and its environs.
4. ***Urban Layout*** entails the spatial arrangement and configuration of elements of the space, such as streets and buildings. This element is crucial for flow throughout the space, and heavily influenced the last three elements.
5. ***Housing and Building Characteristics*** denotes the aesthetics of a place, contributing to the overall pedestrian experience and uniqueness.

In addition, Dempsey et al. (2010) note that even though these five elements overlap and play a part in influencing the experience of a space, it is beneficial to consider each element separately instead of collectively to appreciate the urban form. On the contrary, some urban designers argue that urban design elements focus on the attributes of cities and towns, i.e. the buildings, transport, streets, public space and landscape (Urban Design n.d.). Comparably, Živković (2019) noted that the core elements of urban form are defined by buildings, streets, blocks and plots. Collectively, these elements merge into a coordinated design structure, defining the urban form. When the urban form is coupled with features that influence the user's experience, the urban design of the space is established.

Upon further investigation, when considering the urban design features, researchers focus on the pedestrian and vehicular circulation, land- and streetscape, history, zoning and layout, socio-demographics and proposed development of the space (Tariq 2007; Rivas 2009; Atallah 2011; Tuyet 2012; Braswell 2013; Ing 2016; Martinucci 2016; Abouakalloub 2017). Throughout the listed literature, researchers meticulously reviewed and explored the urban design fabric within the space, addressing their qualities, user perception and shortcomings, unlike the research regarding transportation elements. The method in which these researchers identified such urban design elements to focus on is a combination of theory/ practice, which influenced their reconnaissance of the space, and feedback from the study area users.

Similar to transportation engineering, the elements of urban design can be viewed from the standpoint of different divisions of the urban space (Dempsey et al. 2010; ASBEC 2015) or can be further broken down into the features that form the space itself (Živković 2019; Urban Design n.d.). Additionally, when researchers study an area, they acquire data and categorise their findings based on the divisions of urban design, but they observe the space based on their elementary foundation: the buildings, streets, transport, public space, and landscape.

2.3 Existing Design Guidelines

Assessment of transportation hubs reviews elements such as traffic conditions. However, the researchers instead focused on providing aesthetic and functional enhancements such as:

- Segregating different modes of transportation, i.e. exclusive bike corridors (Martinucci 2016).
- Incorporating landscape and streetscape techniques (Tariq 2007; Rivas 2009).
- Redistribution of the spatial features, such as public squares, to incorporate an inclusive land-use strategy (Logan 2012; TCPD 2014; Mohammed 2018).

The extent of transportation engineering in the research reviewed can be summed up as the geometric layout of the streets and pavement, which can be considered a construct of urban design. Furthermore, literature focusing on such transit spaces explores most, if not all, of the urban design elements detailed in Section 2.2.2 above, highlighting quantifiable features such as the sociodemographic and intangible qualities of the space, including the aesthetics of the buildings and streetscape.

Other literature focusing on transit systems in an urban setting was published in transportation jargon and overlooked the urban design facets explored above (Pascucci and Friedrich 2017). Similarly, urban design publications, which focus on transportation sites, explore the space solely through the scope of an urban designer (Logan 2012; Martinucci 2016; Abouakalloub 2017). Thus, such literature was not considered relevant, as integrating transportation engineering and urban design disciplines are paramount to this research.

Design guidelines that encompass TEUD disciplines were partial to urban design. This observation may result from urban design, being an interdisciplinary field by nature, encompassing aspects of transportation engineering. Thus, this research seeks to develop design guidelines that utilise techniques that integrate TEUD features.

Ing (2016) presents the framework most compatible with this research. Ing analysed urban design features such as: nodes of interest; existing land uses; built environment and aesthetic features; and transportation engineering aspects such as: traffic; network routes; pedestrian facilities; traffic and accidents data. Using this framework, Ing developed an integrated design toolkit for Kapahulu Ave, Honolulu, Hawaii, an example of the type of guidance this research aims to develop.

A common trend in the literature was acknowledging the need to shift from a traditional automobile-driven design paradigm to accommodate other, if not all, hub users. This trend is parallel to the complete street concept. Noting this trend in modern street design policies and guides across TEUD departments worldwide, there has been a demand for greater awareness of other transportation modes and accommodating a wider variety of users (Newcombe 2013). Some departments implemented this concept by reconceptualising their design manuals. The award-winning Complete Streets Design Guidelines for the City of Boston (Toole Design Group 2015) guide shifts the design paradigm from the separation of modes to integrating every mode into each chapter (City of Boston. BTP 2013). Thus, creating new tools to balance the modes.

Furthermore, Laplante and McCann (2008) highlight that complete streets are simply an evolutionary step towards accepting all modes of transport by accommodating a quick and cheap multimodal fix for all public space users. Furthering this notion, Hui et al. (2018) observed that popular complete street guides accommodate safe access for all road users but lack essential elements of complete street classification and that the extent to which the users must be served varies based on the context of the streets. Sousa and Rosales (2010) argue that the complete street may not require accommodation for every mode. Context Sensitive Solution (CSS) by ITE, is a project-oriented and location-specific process to ensure a road project fits its context. CSS is presented as a complementary framework to the Complete Streets guidelines instead of an alternative (Laplante and McCann 2008). Given the nature of Curepe Junction, segregating public transit, the combination of the Complete Street guidance and CSS process, is a well-suited framework guide.

Toth (2019) expands on the philosophies of CCS and Complete Streets, and how they can build communities through transportation rather than building transportation through communities. Toth suggests that transit stops can be developed into hubs that support the daily needs of the people who heavily rely on public transportation. Applying the placemaking concept, together with CCS and Complete Streets, PPS developed the Portals to Places initiative. This initiative focuses on creating terminals that function beyond an entry and exit point by opening communication between the users and stakeholders, to increase transit ridership, improve public perception of transit service, and improve quality of life for transit riders (Toth 2011; Project for Public Spaces 2019; Toth 2019).

Other prominent guidebooks referenced within the industry, such as the Chartered Institution of Highways and Transportation's Manual for Streets 2 (2010), addressed problematic transportation elements with surface-level solutions, lacking the in-depth details required for this research compared to the guidebooks detailed above. Thus, such literature was only referenced as a general guide and not the main source for the design guidelines presented in this research paper.

While there are many international guidelines, research papers, and few local documents for developing a transportation hub, this chapter focused on reimagining the space into a more suitable environment for the end-users. The literature review identified the gaps in current publications, further validating the need for this research, summarising that the Complete Streets, CSS and Portals to Places, appear to comprise a solid foundation for a toolkit to improve Curepe Junction.

2.4 Existing Methodologies and Analysis

A mix of primary and secondary data collection methods used to assess a transportation hub and develop public spaces is summarised as below.

Table 1: Synopsis of existing methodology

	Reference	Methodology			
		<i>CS</i>	<i>E</i>	<i>I</i>	<i>Q</i>
<i>International</i>	Trancik (1986)	✓			
	Tariq (2007)	✓	✓	✓	
	Rivas (2009)	✓	✓	✓	
	Atallah (2011)	✓		✓	✓
	Logan (2012)	✓	✓	✓	
	Tuyet (2012)	✓		✓	
	UNDESA (2012)	✓			
	Fine Young Urbanists (2014)	✓	✓	✓	
	Ing (2016)	✓	✓		
	Martinucci (2016)	✓	✓		
	Abouakalloub (2017)	✓	✓	✓	✓
	Jones (2017)	✓		✓	
	Knupfer, Pokotilo, and Woetzel (2018)	✓		✓	✓
	Critton and Polstein (2019)	✓		✓	
	Stojanovski (2020)	✓	✓		
<i>Local</i>	TCPD (2014)	✓	✓		
	Mohammed (2018)	✓	✓		

Legend - CS = Case Study; E = Experimental Data; I = Interviews; Q = Questionnaires

2.4.1 Secondary Data Collection

Evident in Table 1, the initial step in developing design guidelines is conducting an in-depth case study. The purpose of the case studies reviewed varied depending on the overall goal. These studies focused on exploring similar spatial features/patterns (Trancik 1986; Stojanovski 2020), transportation systems (Logan 2012; Martinucci 2016), trends which the upgraded system wishes to follow (Tariq 2007; UNDESA 2012; Ing 2016), and the historical character of the studied space

the researcher is seeking to preserve (Rivas 2009). In this case, the literature selected was based on a combination of the trends, but most importantly, the researcher's need to assess an urban transportation space and develop guidelines for the hub users.

2.4.2 Primary Data Collection

2.4.2.1 Experimental Data

Site observations to decipher behavioural patterns (Rivas 2009; Martinucci 2016; Abouakalloub 2017); existing features (Tariq 2007; Logan 2012; TCPD 2014; Mohammed 2018); and field measurements of elements within the space were the most utilised techniques in developing guidelines. The importance of site visits for any TEUD hub cannot be overstated. This approach exclusively creates an opportunity for the researcher to observe the space in action and discover scenarios that literature cannot portray (Rivas 2009; Ing 2016; Critton and Polstein 2019).

The recommended size or boundary of the study area varied based on the preference of the researchers. Some researchers narrowed their study based on a prominent street in the study area (Rivas 2009; Ing 2016), while others relied on densely travelled paths (Martinucci 2016; Abouakalloub 2017; Critton and Polstein 2019). Gehl (2011) discusses the boundaries of the study area based on utilising the social field of vision concept. Gehl concluded that at 100m from a transit stop, the observer could comfortably identify the details of people and their movement patterns. Additional literature indicated that the number of passengers is optimum within 100–200m walking distance from a transit stop and halved beyond this distance (O'Sullivan and Morrall 1996; Daniels and Mulley 2013). Stojanovski (2020) further supported these two concepts, noting that the most effective way to study a transit stop is within a 100m radius. Stojanovski reiterates that the optimal study area is attributed to visual proximity, stating that 100m is an ideal distance to observe the urban features of the space.

Furthermore, Ing (2016) addressed the walkability of Kapahulu Avenue by utilising the walk score. Ing associated the walkability scores with the appeal and user-friendly attributes of the space. The Walk Score® is a patented algorithm that estimates a location's walkability from a scale of 0 to 100, based on its proximity to essential amenities, such as grocery stores and restaurants, that are weighted based on importance to the person walking (Carr, Dunsiger, and Marcus 2011; Hirsch et al. 2013; Walk Score 2007).

2.4.2.2 Interviews

Semi-structured interviews with people linked to the research topic were the most utilised approach in developing guidelines internationally. The interviewees ranged from hub users (Rivas 2009; Critton and Polstein 2019) to experienced professionals (Tariq 2007; Rivas 2009; Atallah 2011; Logan 2012; Tuyet 2012; Abouakalloub 2017; Knupfer, Pokotilo, and Woetzel 2018). Even though Ing (2016) did not conduct interviews, she noted the importance of collecting this input from the local community and stakeholders of the area, and how such data can aid in developing a well-integrated design guideline to suit its users.

The interview size varied based on the size of the study area. For example, Rivas (2009) interviewed 15 randomly selected stakeholders along Boulevard Provencher. Conversely, Knupfer, Pokotilo, and Woetzel (2018) sought the advice of more than 30 transportation experts from both the public and private sectors worldwide to weigh their list of indicators according to the impact on the quality of life in 24 cities. Even though the scale of the interviews varied, the approach in the analysis was empirically derived, utilising an inductive approach to develop theories and trends instead of a preconceived deductive approach.

2.4.2.3 Questionnaires

Laplante and McCann (2008) argue that data should be collected from all hub users and modes for a complete street to be truly effective, not just from the pedestrians but also from the drivers and community. Even though there is valuable information from conducting online surveys, it is evident from Table 1 that this is the least preferred option.

2.4.3 Research Validity

The researchers all lacked the final step of testing the validity of their design guidelines. Instead, they concluded their research by implementing their toolkits instead of testing their validity, especially with the end-users.

This researcher acknowledges that design guidebooks are a credible source of information. However, such books were developed with a range of network applicability. Thus, some guidebooks propose a validity check, such as Calgary's Complete Streets Guide (2014), which presents a street's "completeness" toolkit by ranking its features using the weighted factors method. According to Calgary's Complete Streets Guide (2014), the minimum threshold for a section of a street to meet the "Complete" criteria is a score of 70. However, this score is specific to the recommendations presented in Calgary's design guide.

Parker (2019) detailed a simplified scoring technique that establishes his toolkit by modes of transportation. Parker further generalises a suggested grading system related to his ideal complete street layout. For example, looking at a pedestrian mode, Parker (2019) suggests the highest points for sidewalks measuring 36 inches or wider. Unlike Calgary's Complete Streets Guide, Parker's method eliminates weighted factors' bias and the need to train individuals who seek to use the evaluation toolkit by suggesting how the user may score the design.

Considering the neglect of such validation checks, in addition to the lack of in-depth transportation assessment mentioned earlier in Section 2.2.1, raises the question of whether issues observed in a transportation space can be resolved by

applying surface-level solutions. Unfortunately, this question cannot be answered based on their research because they all overlooked the most fundamental validation check, the user's feedback on the proposed design. The consequence of overlooking this final step contradicts the premise of "designing for people" if they do not have the final say.

2.5 Gaps in Current TEUD Research

The gap identified during this literature review was that the academic research addressing TEUD guidelines collectively is predominantly Urban Design-driven instead of having a well-integrated blend. This research project aims to rectify this prejudice and develop design guidelines that balance and integrate system.

2.6 Summary of Key Findings from Literature Review

The research consensus identified was that a successful space is achievable when a collection of disciplines works together. Furthermore, the core elements from each discipline overlapped, matching the inputs of The Place Diagram. This diagram is a significant component in achieving a successful place within the Complete Street, Context Sensitive Solution and Portals to Places guidance. Thus, these concepts and guidelines will play a crucial role in redefining Curepe Junction.

Based on the synopsis in Table 1, conducting case studies, experimental data, and semi-structured interviews are the preferred steps in developing a framework for a great place and fulfilling the objectives of this research. Researchers have highlighted that a successful design for a specific area is efficiently achieved by conducting interviews with the hub users. This approach allows the researcher to cater to varying perspectives and explores the ideas, values, and vision that the researcher may often overlook. These observations will guide the development of the methodology and research going forward and address the validity and research gaps identified.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Philosophy

This research aims to develop guidelines to redefine a transportation hub such as Curepe Junction, primarily based on qualitative and quantitative judgements of hub users. The methodology behind this research is unconventional in its approach, especially in Trinidad and Tobago, in that it interprets 100 hub user responses to design a space reimagined by its users. The research utilises concepts such as The Complete Street, Context Sensitive Solution and Portals to Places to present a redefined Curepe Junction.

Despite using a mixed-methods approach, the primary approach utilised for the methodology is qualitative, exploring the interpretations of Curepe Junction from the sole perspective of the hub users. While the research features aspects of quantitative analysis when gathering data within Curepe Junction, the level of analysis required for this research is unsuitable for a purely quantitative approach.

3.2 Methodology Sequence

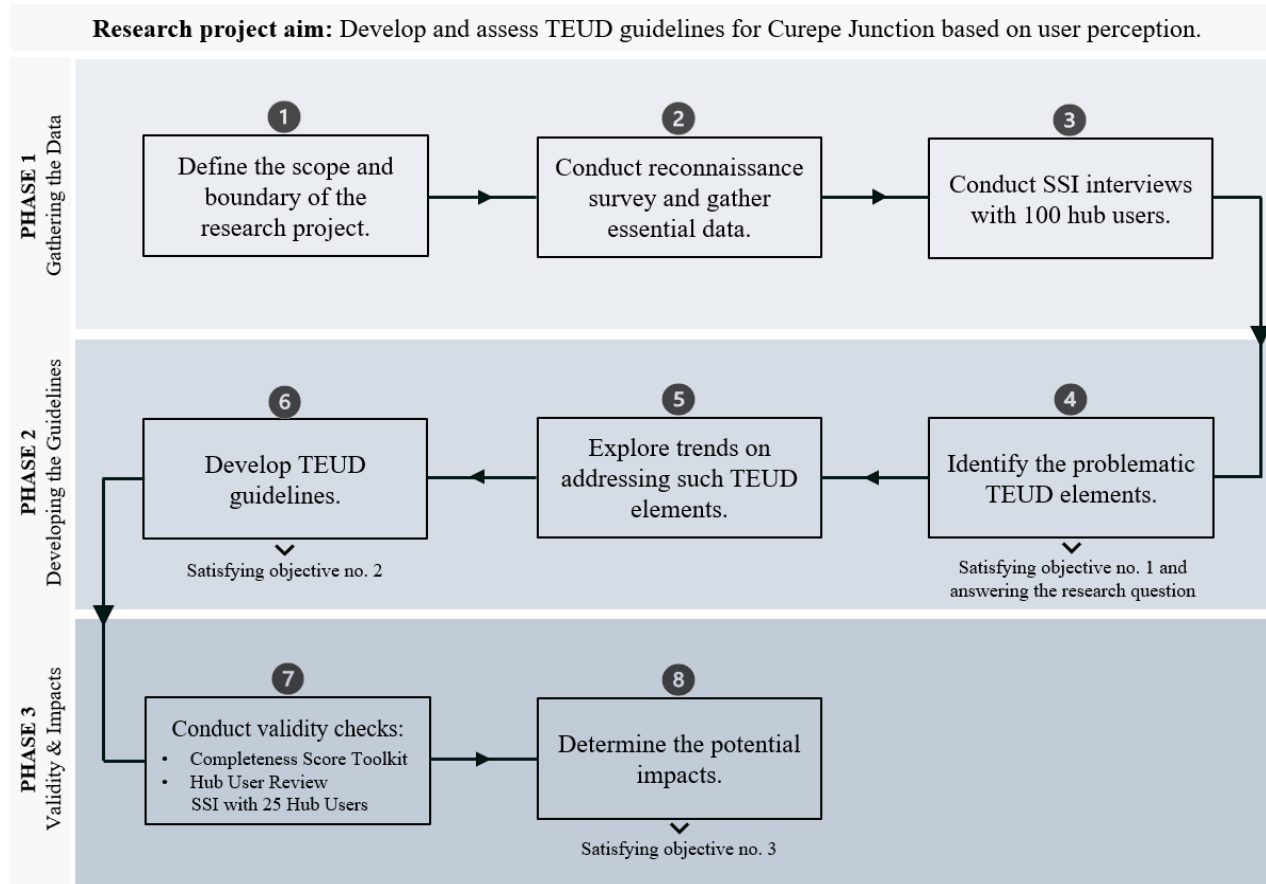


Figure 3.1: Methodology flow chart summary

Illustrated in the flow chart in Figure 3.1, the research was categorised into three phases and is further broken down into eight stages detailed below. Stages 4, 6 and 8, represents fulfilling objectives 1, 2 and 3, respectively.

3.2.1 Phase 1: Gathering the Data

Phase 1 addresses the scope of the project and the methods of gathering data to inform the guidelines.

- **Stage 1** identifies a definitive scope of the research area. Based on Stojanovski's (2020) recommendation, a 100m radius from the centre of Curepe Junction was studied, as illustrated in Figure 3.2. This boundary encompasses a range of hub users, from people accessing retail stores to people utilising both public transportation and private hired transit services.



Figure 3.2: Curepe Junction boundary

Source: Adapted from Google Earth (2021)

- **Stage 2** details Curepe Junction's reconnaissance survey, including observations, layout, and general movement around the space. In addition to surveying the site, essential data, such as pedestrian counts, were collected to determine the sample size for data collection.
- **Stage 3** entails conducting Semi-Structured Interviews (SSI) with the hub users, such as the business owners and transit users.

A qualitative and flexible data collection method, such as SSI, allowed the researcher to ask pre-determined questions and expand on specific questions. This flexibility provided unique perceptions, expanding the researcher's awareness of the space.

This technique not only eliminates bias but assisted in understanding the issues experienced with the TEUD elements (dependent variables) from varying perspectives of the hub users (independent variables) within Curepe Junction (control variable). A template of the SSI questions is included in Appendix B.

3.2.2 Phase 2: Developing the Guidelines

Phase 2 explores the process of developing the TEUD guidelines best suited for the concerns experienced at Curepe Junction. This phase will also tackle objectives 1 and 2 and answer the research question.

- **Stage 4** allowed for the findings and responses from the SSI with the hub users to be examined in detail and the problematic TEUD elements to be identified, satisfying the first objective, and answering the research question.
- **Stage 5** reviewed guidelines, academic literature, and trends on addressing the problematic elements identified.
- **Stage 6** developed the TEUD design guidelines to treat the problematic elements within Curepe Junction.; thus, satisfying objective 2.

3.2.3 Phase 3: Validity and Impacts

As highlighted in Section 2.4.3, past literature lacked validity in the final stage of their research. Thus, phase 3 aims to bridge the gap between the conceptual guidelines and the end-users and introduce additional validity checks. The inclusion of this phase satisfied objective 3 and allowed the researcher to defend the project and acquire feedback on the potential impacts of implementing the guidelines.

- **Stage 7** performed validity checks on the guidelines via:
 1. **Completeness Score Toolkit** was developed to assess the current completeness of Curepe Junction and provide an evaluation tool for applications throughout hubs in Trinidad and Tobago. This toolkit will allow future designers to ensure their proposed design is within a “Completeness” design range.
 2. **Hub User Review** of the redesigned Curepe via SSI allowed the end-users to provide a diverse and new outlook on the design. This stage provided valuable data to the researcher to assess the potential impacts the design can have on redefining Curepe Junction.
- **Stage 8** satisfies objective 3. This stage assessed the responses from stage 7 and highlighted the potential impacts the guidelines can have on Curepe Junction.

3.3 Pilot Study

A pilot study involving three randomly selected hub users was conducted to ensure that the selected research tool, SSI, performed as anticipated. This allowed the researcher to conduct a small-scale **Stage 3** trial, in return, providing an opportunity to manage any uncertainties responders had with the questions and eliminate foreseeable issues by gaining an understanding of the general flow and interpretation of questions. Once completed, a period of reflection was undertaken to assess the potential of the designed SSI to collect relevant information that would guide **Stage 6** and allow for a period of refinement.

Overall, the interviewees from the pilot study agreed that the questions covered a range of items and adequately captured their views on Curepe Junction; thus, no additional questions were necessary. Minor changes were made to the SSI after the pilot study, which are itemised below:

1. The duration of the interviews varied from 15 - 40 minutes, offering considerable unrelated information on the open-ended questions. One interviewee had to shorten the SSI to avoid missing her ride home. The revision allowed for fewer open-ended questions and more yes/ no and Likert Scale questions. This change kept the response time below 10 minutes and kept the answers on track while allowing room for discussions where necessary.
2. The initial SSI layout attempted to segregate different elements, such as their walking and travelling experience, and their views on street and facility elements. However, their responses and interpretations overlapped with one another, deeming most questions repetitive. Thus, their experience of Curepe Junction was collated.
3. Questions on the hub user's ideal vision or what they would like to change in Curepe Junction were deemed too vague, often stating that they were satisfied with Curepe. However, when asked about their opinions on the physical elements within Curepe, they had unfavourable opinions which contradicted their initial response. This issue was addressed by removing the vague questions and focusing on the interviewee's opinions on the physical aspects of Curepe and only at the end, asking them if there were anything they would like to add or recommend. By adding this question at the end, the interviewees were reminded about the elements they were dissatisfied with and were better equipped to answer.
4. Questions regarding the physical state of Curepe Junction that the researcher could address during the reconnaissance survey were removed. Such questions were initially added to eliminate bias on the researcher's part. However, the researcher deemed such questions

unnecessary based on the shared views on obvious physical conditions, such as uninviting littered paths and uneven sidewalks.

Overall, the responses were diverse yet on track with what was anticipated and offered information that this researcher believes would provide sufficient information to design the guidelines. The decision to use SSI proved most beneficial, allowing for flexibility during the interview and providing sufficient time and freedom to discuss topics highlighted by the hub user.

3.4 Data Collection and Analysis

Table 2 summarises the primary sources of data and analysis throughout this research.

Table 2: Data collection and analysis synopsis

Stage	Data Collection		Stage	Analysis	
	Method	Target Audience		Method	Satisfy
3	SSI	100 Hub Users	4	Qualitative Content Analysis	Obj. 1 & RQ 1
7	SSI	25 Hub Users	8		Obj. 3

3.4.1 Semi-Structured Interviews

This research targets user perception in efforts to develop a redefined place for the end-users; thus, the main source of data collected was SSI. For stages 3 and 7, interviews were conducted with hub users.

Even though most of the researchers mentioned in *Chapter 2* randomly interviewed hub users as they passed by and the sample size for their SSI varied from paper to paper, this research will utilise a more methodical approach in determining the appropriate sample size.

The modified Cochran Formula for a known population, utilised by Statistics How To (2013) and SurveyMonkey (2015), provides a technique for calculating the anticipated sample size, and is provided below:

$$\text{Sample Size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N} \right)}$$

Where:

- **The Z-score, z**, is based on the chosen Confidence level. For the purposes of this research, a confidence level of 90% was selected, giving a z value of 1.645 from the Z-Score Table.
- **The Population Proportion, p**, is the estimated percentage of the population that best contributes to the purposes of the survey. Upon observations of movement in Curepe Junction, specifically along the PBR during rush-hour, it was observed that for every 10 people that exited a bus, an average of 2 people passed through the CTM, the other 8 immediately transferred onto another bus. Thus, only 20% of people exiting the PBR utilise Curepe Junction's hub and benefit the most from a redefined space.
- **The Margin of Error, e**, is the desired level of precision. For the purposes of this research and as a recommended error value of best design practice, ± 5% margin of error was used.
- **The Population Size, N**, is the approximate population size of the study area. During Curepe Junction's rush-hour, an average of 200 people were observed moving in and around the CTM. This location was chosen to count hub users not only because this location is the centre of the project's scope area, but it also encompasses a range of hub users, from pedestrians to people working in nearby shops, as well as individuals living in the area.

Using the values listed above, the sample size was calculated to be:

$$\therefore \text{Sample Size} = \frac{\frac{1.645^2 \times 0.2 (1-0.2)}{0.05^2}}{1 + \left(\frac{1.645^2 \times 0.2 (1-0.2)}{0.05^2 \times 200} \right)} = 93 \text{ people} = \sim \underline{\underline{100 \text{ hub users}}}$$

Surveys were conducted randomly throughout the day due to activity throughout the hub being consistent during the daylight. This option allowed for discussions with individuals who were enjoying the space and expanded the SSI reach outside of the commuters rushing through the space during rush hour.

For stage 7, a portion of the calculated sample size, i.e., 25 hub users, were interviewed to achieve general feedback on the redesign. The responses varied on random days during the week to ensure that a comprehensive spectrum of perceptions was interviewed. Each interviewee was asked questions from the SSI interview templates, provided in Appendix A, where the general areas for questions directly related to the aim and objectives of the research. Furthermore, each hub user was informed of the purpose of the study and that their responses would remain anonymous.

A qualitative content analysis approach was used to evaluate the SSI data collected. The responses were transcribed manually to ensure all critical feedback were deciphered. This qualitative data collection method coded the data and distinguished themes, allowing for the data to be presented graphically. The following illustration provides the steps undertook for analysing the SSI feedback.

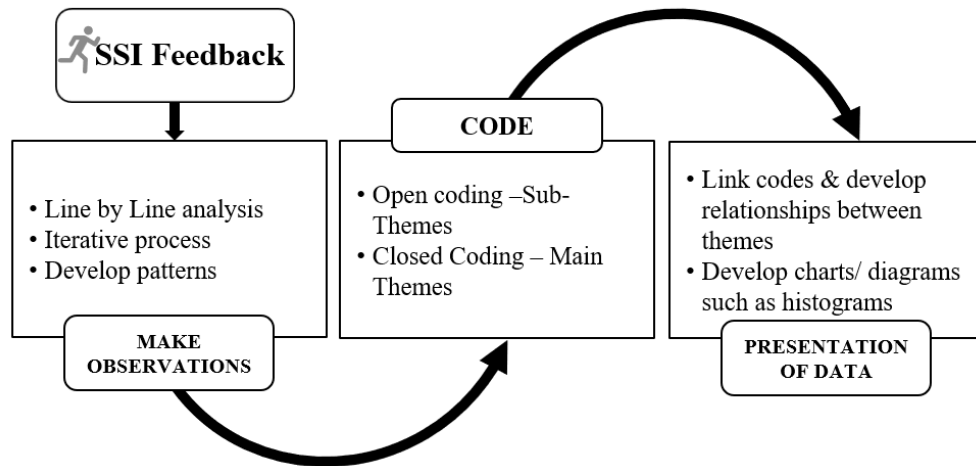


Figure 3.3: Qualitative content analysis approach for SSI

3.4.2 Additional Data

3.4.2.1 Field Data

During stages 2 and 6, data such as field measurements, pedestrian and minor vehicular counts and movements would utilise a measuring tape, tally sheets and a stopwatch. This data was developed in illustrative software such as AutoCAD to represent Curepe Junction and aid in redesigning the space visually.

3.4.2.2 Literature

The main literature source was via UWI's Alma Jordan Library. UWI's Library is subscribed to an abundance of Engineering databases, such as ProQuest and EBSCOhost, which provide case studies, scholarly journals, dissertations, and theses. When additional literature was required, Google Scholar was utilised.

3.5 Limitations

One of the most notable limitations in conducting background research for this project was the lack of accessible local resources and data. The only document relating to this research was "St. Augustine Education City: Spatial Development Strategy and Regulatory Framework" by TCPD (2014). Thus, this paper assumes that other documents do not exist and sought external/ foreign research that covered the themes of this paper.

Due to COVID-19 pandemic restrictions, such as work from home and online schooling, in effect throughout Trinidad and Tobago, Curepe Junction was notably less congested. Therefore, such people, specifically school children, may have provided a unique insight into how one can reimagine Curepe Junction. However, based on the 100 hub users' responses, the data was sufficient to develop and redefine Curepe Junction.

CHAPTER 4

DISCUSSION OF FINDINGS

4.1 Integration of Transportation Engineering and Urban Design

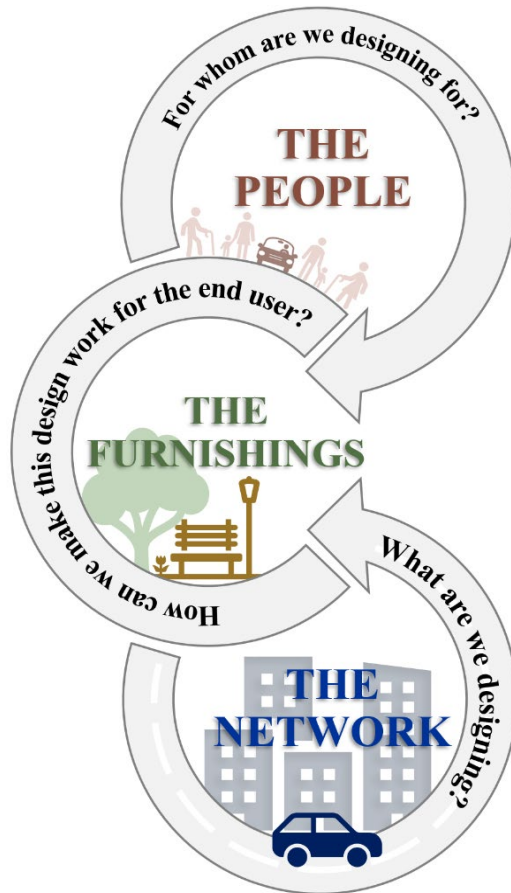
When considering any public transportation space, the two disciplines utilised are transportation engineering and urban design. Even though these two disciplines naturally blend into one another, as detailed in Section 2.2 TEUD Elements, they both individually contribute to optimising transportation hubs such as Curepe Junction.

From the above research, it was evident that transportation engineering concepts often resurface in elements of urban design. Thus, three core elements emerge as key contributing factors across both disciplines, answering three standard design questions:

1. For whom are we designing?
2. What are we designing?
3. How can we make this design work for the end-user?

Answering these questions, as they relate to the elements and concepts of any TEUD structure, the following three core elements were found.

Table 3: The three core elements of any TEUD Structure



1. **The People** – This categorises the users of the transportation space, whether they are driving, being driven, walking or contribute to the makeup of the space. This grouping technique mimics the multimodal format from the Boston Complete Streets, where pedestrians, bicyclists, and transit users are on equal footing with motor vehicle users.
2. **The Furnishings** – This categorises the experience boosters of the space. The furnishings are design features added to the space to enhance the users' experience as they manoeuvre through the built fabric, i.e., the network.
3. **The Network** – This categorises the fabric of the space, which looks at the buildings, streets, and transportation system.

Comparing the qualities of a great place in Section 2.1 and the elements of TEUD in Section 2.2, there are essentially tantamount to each other. A successful complete street/ place aims to harmonise the two disciplines. Thus, it can be deduced that the success of a space relies on a well-integrated TEUD space, i.e., a place that incorporates and expands on all three core elements.

Furthermore, the latter two core elements, the furnishings and the network must be designed for the people in order for the place to be successful, i.e. not one sub-grouping of people, such as drivers, but the collective whole.

4.2 Reconnaissance Survey of Curepe Junction

The reconnaissance of Curepe Junction details the observed behaviour of the hub users, the physical characteristics and condition of the space from the perspective of the researcher during the period of study. This step is crucial in determining the topics to address with the hub users and, ultimately, the design guidelines.

4.2.1 The People

The people of Curepe Junction, henceforth referred to as the hub users, are those who will be directly affected by changes to Curepe, such as pedestrians, residents, business owners and employees, drivers, and travellers. Movement throughout Curepe Junction was observed over five months. People of all backgrounds, gender and age can be seen hopping from one mode of transport to another or making their way to the nearest fast food outlet before travelling.

Curepe Junction is constantly bustling with movement. Within the transit mall, strangers exchange stories and socialise or sit and read their newspapers. Vendors, street dwellers, and pedestrians collide on the sidewalks upon exiting the mall. Merchants clutter the streets of Curepe, and taxi conductors pester passers-by. However, among the chaos, one can find pedestrians passing one another and exchanging pleasantries or undauntingly asking for assistance, whether elderly requesting help or a novice traveller in need of directions.

Beyond the aura of the people, Curepe Junction is labelled as a hotspot. Based on documentation obtained from the Crime Records and Information Section from the Crime and Problem Analysis Branch of the Trinidad and Tobago Police Service (TTPS) from 2017 to 2020, the following are offences experienced within and near the research radius (CAPA 2020):

- 48 counts of robbery, primarily around the SMR and EMR.
- 17 counts of breaking offences, primarily around the EMR.
- 11 counts of general larceny, primarily around the SMR.
- 10 counts of larceny of motor vehicle, primarily around the SMR.
- 6 counts of other serious crimes, primarily around Riverside Road.
- 6 counts of possession of firearm and ammunition, primarily around SMR.
- 4 counts of kidnapping, primarily near the taxi stands.
- 4 counts of wounding or shooting, primarily around the SMR.
- 3 counts of fraud offences, primarily around the EMR.
- 3 counts of murder, primarily around the SMR.
- 1 count of possession of narcotics for trafficking, around the CTM.

4.2.2 The Furnishings

Curepe Junction lacks enjoyable features for its users, such as greenery, art, proper seating accommodations and adequate shelter. The outdoor seating provided at the CTM were often left unoccupied during the study period. Travellers were observed huddled inside the building peeping through the bars, occasionally checking to see if their transport had arrived, assumedly to avoid the poorly placed hostile public furniture, as evident in the image below.



Figure 4.1: Seating and shelter at the Curepe Transit Mall

In addition to the lack of furnishings, the incorporated features were not sufficiently monitored and maintained to ensure continued functionality. The flaws observed to contribute to the degradation of the user's experience are listed below and illustrated in Figure 4.2:

- a) Excessive litter throughout the hub due to insufficient garbage bins along the streets and timely garbage pickups by the county.
- b) Clogged drains due to a combination of excessive litter and socially displaced people purposely clogging the manholes with said litter.
- c) Unsafe sidewalks with missing, damaged or raised manhole covers.
- d) Vendor congested sidewalks, blocking the sidewalk ramps and path.
- e) Malfunctioning signalised crossings, mainly due to anxious taxi conductors constantly pressing the buzzer to usher potential passengers their way.



Figure 4.2: Furnishing flaws throughout Curepe Junction

Due to the defective crossing signals, pedestrians were observed darting through ongoing traffic, creating unnecessary traffic delays. In addition to the designated crossing sites, two distinct zones had the highest rate of jaywalking, highlighted in Figure 4.3.

The first zone, along the EMR, can be due to factors, such as the previously mentioned issues with the signalised lights or the nonchalant culture and law enforcement in Trinidad and Tobago, where pedestrians cross wherever they deem appropriate opposed to walking to the nearest crosswalk. Pedestrians within the second zone, along the PBR and Evans Street, prefer to cross along this zone to access the bus shelter instead of walking to the junction's designated pedestrian crossing and looping back. This observation highlights the need for safer, more frequent, and better-maintained pedestrian crossing zones around the transportation hub.

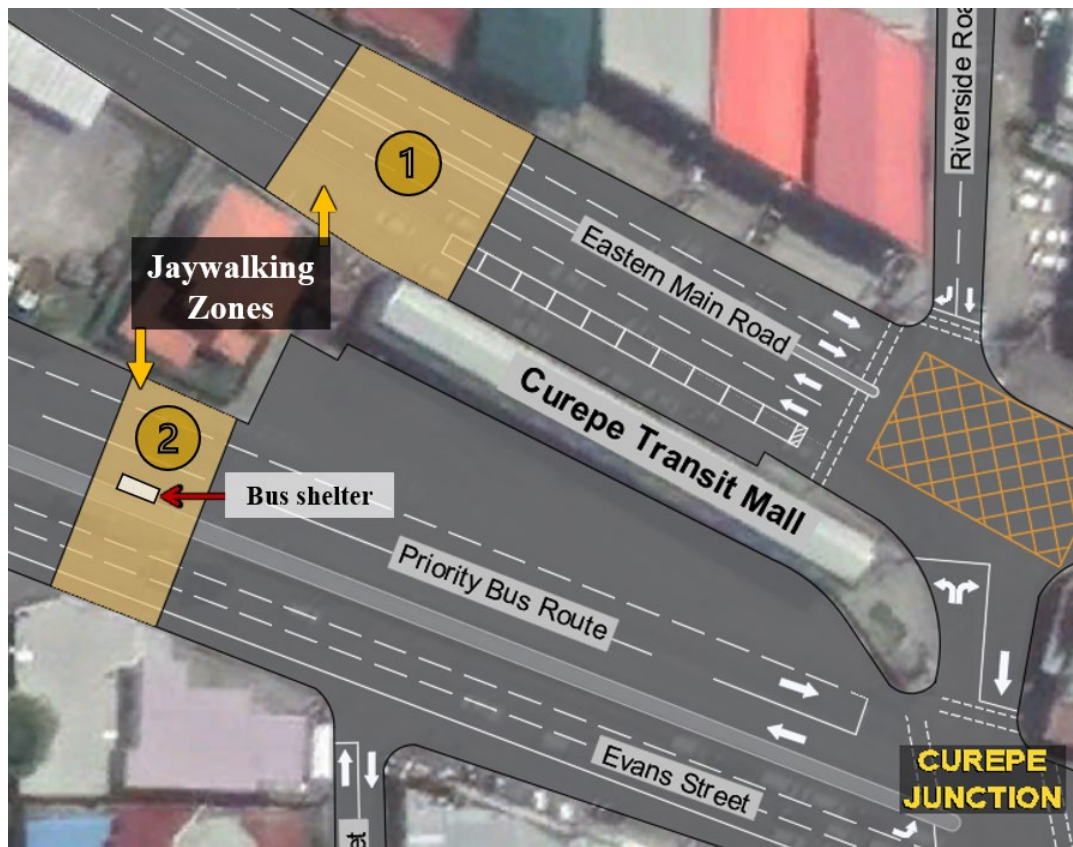


Figure 4.3: Zones with the highest rate of jaywalking

Despite the updated exterior, the CTM is poorly maintained and lacks cultural and nostalgic character. The pedestrians rarely explore the outdated interior, with its neglected commencement plaque obscured within a mall booth.



Figure 4.4: Curepe Transit Mall

Overall, the furnishings element is in dire need of urban design input. Thus, Curepe Junction serves as a “means to an end” rather than an enjoyable and aesthetically appealing destination.

4.2.3 The Network

Curepe Junction can be classified as a busy commercial district centred around a major transportation hub that services all four cardinal points of Trinidad. This section analyses the road network and the built network of Curepe Junction, detailing the major cross-sections within Curepe Junction and providing a breakdown of the establishments within the 100m study area.

4.2.3.1 The Road Network

The road network within the study's radius comprises of two major collector roads: the Eastern Main Road and the Southern Main Road, a minor collector road, Riverside Road, and three access/ local roads: Sellier Street, Evans Street and Broome Street. Additionally, the speciality network is named the "Priority Bus Route", which is only accessible to authorised vehicles, such as public transport vehicles, first responders, Government Agencies, and permitted private/ commercial vehicles.

Appendix A: Data Collection details sectional views of the main roads surrounding the junction, inclusive of dimensions, the signage, and a synopsis of each lane. Below is a summarised comparison of the measured dimensions within the junction and the standard dimensions set out by TCPD (Republic of Trinidad and Tobago. TCPD 1988, 48). Evidently, the majority of the actual measurements within Curepe fall within the TCPD's standards.

Table 4: Comparing CJ Road dimensions with TCPD's recommended values

Category	Road	Road Dimensions/ m			
		Carriageway Width		Lane Width	
		<i>TCPD</i>	<i>CJ</i>	<i>TCPD</i>	<i>CJ</i>
Collector Road	EMR	7 - 10	8.45	3.5 - 5	2.65 – 3.45
	SMR	7 - 10	9.7	3.5 - 5	4.7 - 5
Minor Road	Riverside Road	6	5.9	3	2.8 – 3.1
Access Road	Evans Street	5	5.5	2.5	2.6

Regardless of the TCPD compliance, the sidewalks are congested, forcing pedestrians to walk along the road and cars and maxi-taxis block the right-of-way. In an ideal unobstructed scenario along the EMR, approximately 20 vehicles can cross the intersection during. However, it was observed that the flow of traffic within the junction was constantly obstructed by maxi-taxis stopping to offload or collect passengers, pedestrians jaywalking, cars reversing out of businesses along the

junction and cars illegally parked along the main road. On average, maxi-taxis stopped for 25 seconds; pedestrians took 15 seconds to cross the EMR, and cars took 30 seconds to reverse onto the main road. The green light phase along the EMR was observed to be 55 seconds. Thus, if just one of these obstructions occurred, the flow of traffic was reduced by half. Unfortunately, a combination of such illegal behaviour occurred daily, especially during peak hours.

Pedestrian movement throughout the intersection was outfitted to function on both automatic and actuated pedestrian phases. However, as previously mentioned, the latter is malfunctioning due to tampering with the pushbuttons. The automatic signalisation at the intersection is both concurrent and protected pedestrian phases, where pedestrians can cross during parallel and conflicting vehicular traffic and during non-conflicting movements with motorists, respectively, as shown in Figure 4.5.

It was observed that the crossing signals along the EMR were defective, which contributed to the high rate of jaywalking, often leaving pedestrians stranded at the traffic island. Overall, even though the current pedestrian phase design is adequate, excluding the chaotic movement along the EMR, the hub user's movements were often noncompliant. Thus, special attention is needed to accommodate the safety of pedestrians as they navigate through the junction.

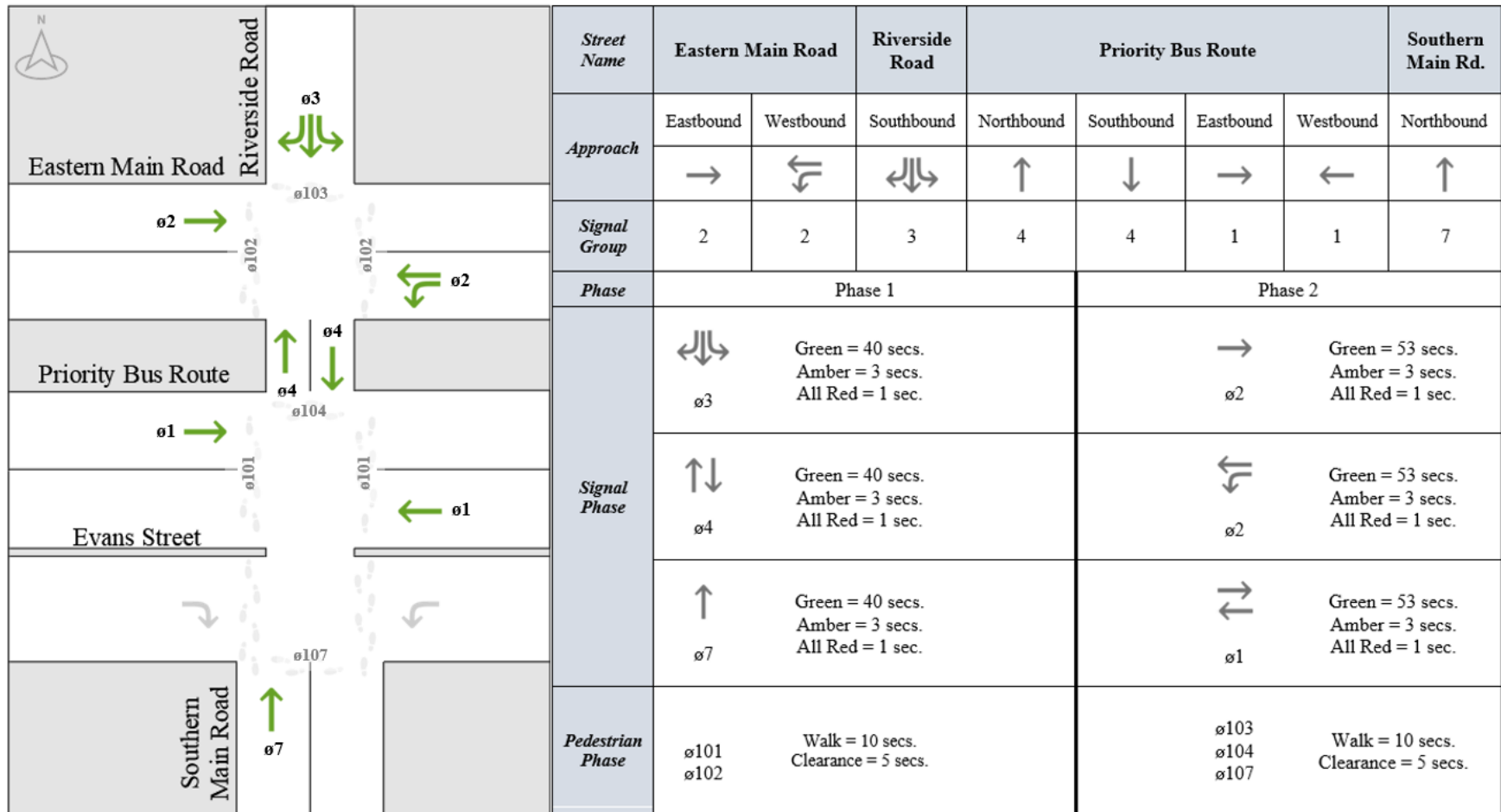
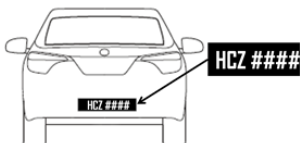
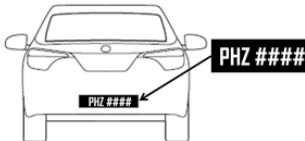
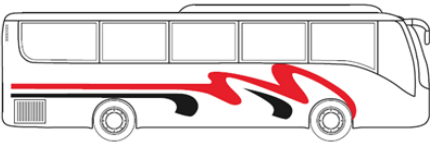


Figure 4.5 Signal phasing diagram at Curepe Junction

4.2.3.2 Modal Choice

Within Curepe Junction, several modes of transportation were observed, excluding private cars. The following public transport services can be seen frequenting Curepe:

Table 5: Curepe Junction's public transportation services

Service	Vehicle	Route
<u>Taxis</u> - Authorised taxis denoted by their “H” for “Hire” licence plates .		All except PBR
<u>Private Taxis</u> - Unauthorised taxis denoted by their “PH” for “Private Hire” plates.		EMR, SMR and Riverside Road
<u>Maxi-Taxis</u> - Colour coordinated mini-buses that travel specific routes. These maxis pick up and drop passengers along the route.	 SOUTH: POS to San Fernando  EAST: POS to Sangre Grande	PBR, EMR and SMR
<u>Buses</u> - Subsidised buses travelling between popular towns and are free to patrons over 65 years.		PBR

Source: Images adapted from Discover Trinidad and Tobago Magazine (2020)

Based on the interviews with the hub users, 38% of the travellers use the maxi-taxis, 21% used the taxis and “PH”, preferring the convenience and frequency of the “PH” taxis, and 8% used the PTSC buses, predominantly the over 65 years hub users. This limited use of the latter was noted as a result of the limited route and

unpredictable wait time. The remaining 33% of hub users used private cars to access the hub, admitting that they often utilise public transportation to avoid commuting along the traffic-ridden roads of Trinidad and benefit from a park and ride system. Overall, 57% of the hub users solely rely on public transportation, and the remaining 43% utilise these services as a quick and more convenient means of transport. Noting that 96% of the hub users stated that they consider public transport a daily life necessity, regardless of having access to private transport services.

4.2.3.3 The Built Environment

Within the 100m study radius, 39 lots were identified. In reference to Trinidad and Tobago's Town and Country Planning Division's land use categorisation, four categories were identified and are detailed below.

1. Residential land use occupies 10% of the 100m study radius. Out of this percentage, 45% of these residential buildings facilitate commercial activities on their property's ground floor, and only 9% accommodates apartments.
2. Commercial land use dominates the study radius with 80%. From this percentage, only 6% of the commercial space is shared by residential use, as mentioned above, and only 7% is shared with institutional purposes.
3. Institutional land use takes up 8% of the study radius, where only one lot is solely for institutional purposes, and the others are shared with primarily commercial space.
4. Recreational land use caters 2% of the study radius, and these are simply two empty and unbuilt lots that are privately-owned.

The above is illustrated in Figure 4.6, where one can readily identify the study area as a predominantly commercial one. The mixed land use lots are presented on the diagram as gradient colours, such as lot 5 representing commercial and residential land use, and lot 10 illustrating both commercial and institutional land use, as opposed to lot 38, which is solely being used for commercial purposes. The privately-owned vacant lots 11 and 22 are also represented on the diagram.

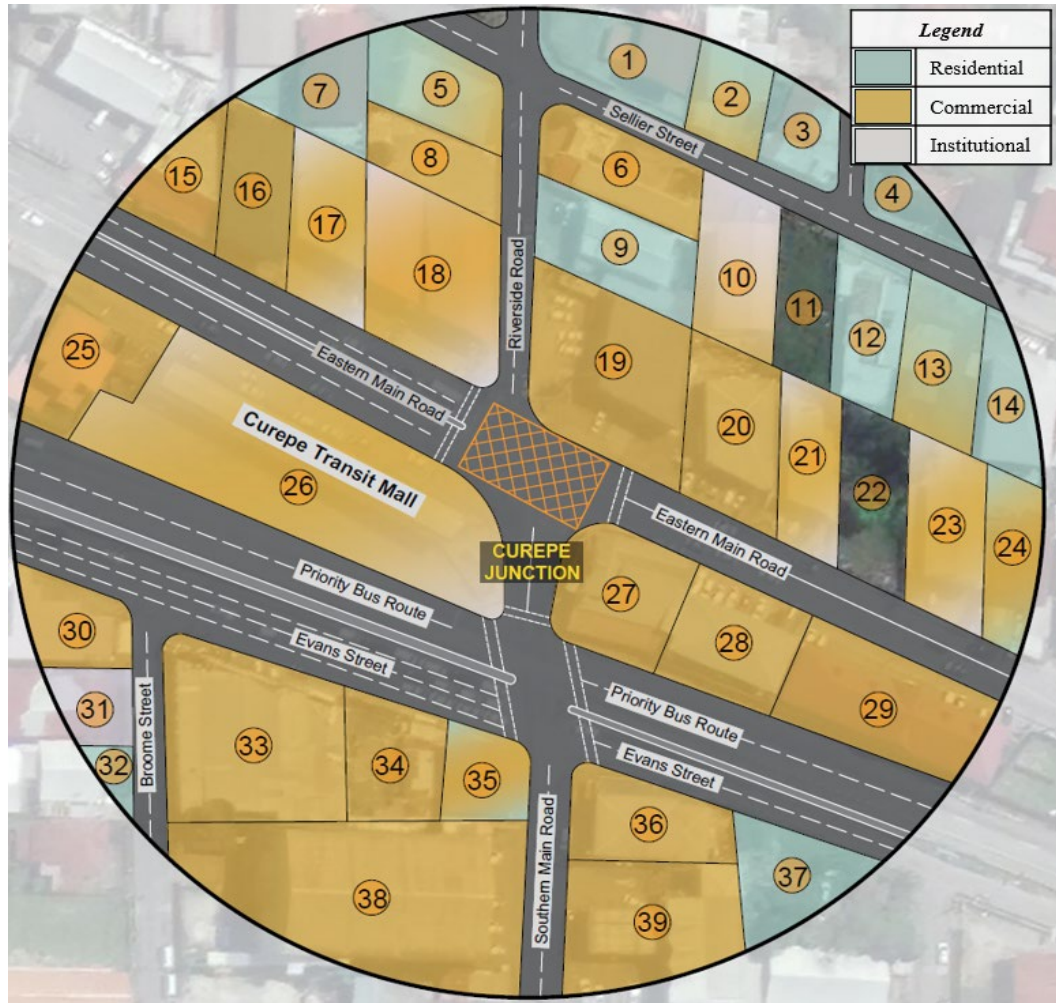


Figure 4.6: Land use categorisation of Curepe Junction

Within the study area, the predominant businesses were food establishments, from fast food outlets to street food, which was closely followed by beauty businesses, from hair products and services to spas. A summary of the types of businesses in Curepe Junction is provided in Table 6, and the detailed listing of each lot can be found in Appendix A.

Table 6: Summary of businesses within 100m radius of Curepe Junction

<i>Business Category</i>	<i>Qt.</i>	<i>Business Category</i>	<i>Qt.</i>
ATM Banking Facility	3	Healthcare facilities	5
Bar	6	Home/ Convenience Store	2
Beauty Services	14	Postal Services	1
Places of worship	3	Printing and Copy facility	4
Clothes	9	Produce stalls	3
Education	4	Recreational/ Extra-Curricular	2
Electronic Stores	2	Seamstress	3
Food Outlets	18	Supermarkets and Minimarts	7
Gambling and Lottery Outlets	5	Shoe Repair Services	1
Gas Station	1	Jewellery Shop	1
Government Services	1	Utilities – Phone services	2

4.3 SSI with the Hub Users

This research aims to design a space that mostly aligns with the hub user's vision of Curepe Junction. Thus, Stage 3 of this research asked 100 hub users a series of questions, provided in Appendix B.1, to determine their views on the space. The questions varied, from getting to know their likes and dislikes of the area, to their personal experience while manoeuvring through the space. The following analyses the responses from the SSI.

4.3.1 The Sociodemographic Factors

Throughout the interview process, people were approached randomly, regardless of their age, race, and gender. The sociodemographic factors are discussed and detailed below. This random method proved to be most suitable because the responses provided opinions and insight from a range of backgrounds. Thus, ensuring that the redefined Curepe Junction can adequately satisfy the spectrum of hub users that use the space on any given day.

4.3.1.1 Gender and Age

The ratio of male to female responders were 63:37, with the highest response age being 51 – 70 years for men and 31 – 50 years for women, illustrated below. The highest overall age group was 41 – 50 years. Overall, older men were enthusiastic to chat about Curepe, rehashing their nostalgic stories and current experiences.

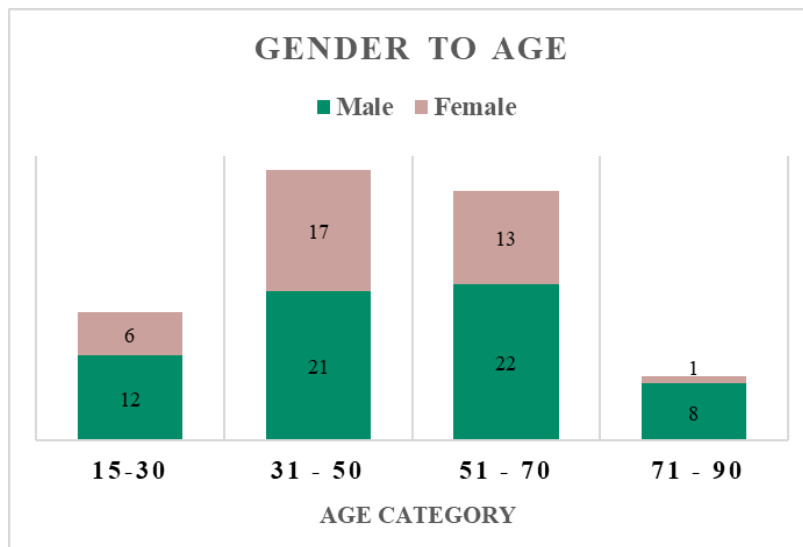


Figure 4.7: Sociodemographic data: Gender and age

4.3.1.2 Occupation

Using the International Standard Classification of Occupations (ISCO) as a guide, the following chart represents the response gender to occupation. The highest response rate was from retirees, presumably because their time was more flexible, and they were able to discuss Curepe in detail instead of busy working hub users. Aside from the retirees, the male trade workers and the female professionals were the second-highest amongst the grouping.

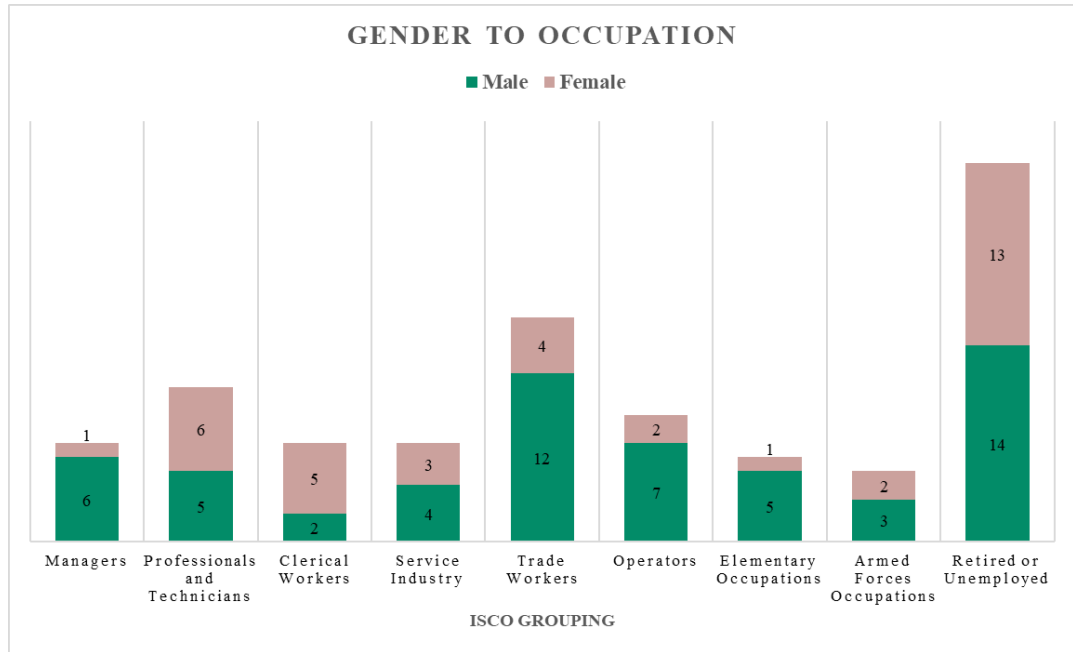


Figure 4.8: Sociodemographic data: Gender and occupation

4.3.1.3 Service Areas

When observing a transportation hub, one identifies the hub's service areas. Based on the data below, it was anticipated that the predominant areas centred around the junction, within the Tunapuna/ Piarco region. The common regions identified were Curepe and St. Joseph, where 19% of the surveyed population resides in Curepe, and 20% resides in St. Joseph.

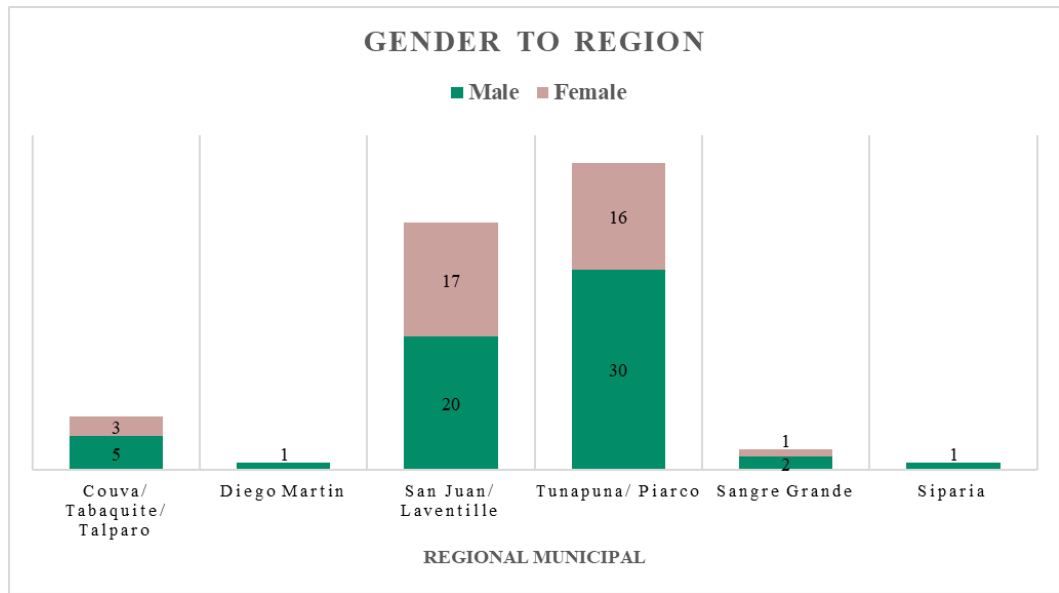


Figure 4.9: Sociodemographic data: Gender and region

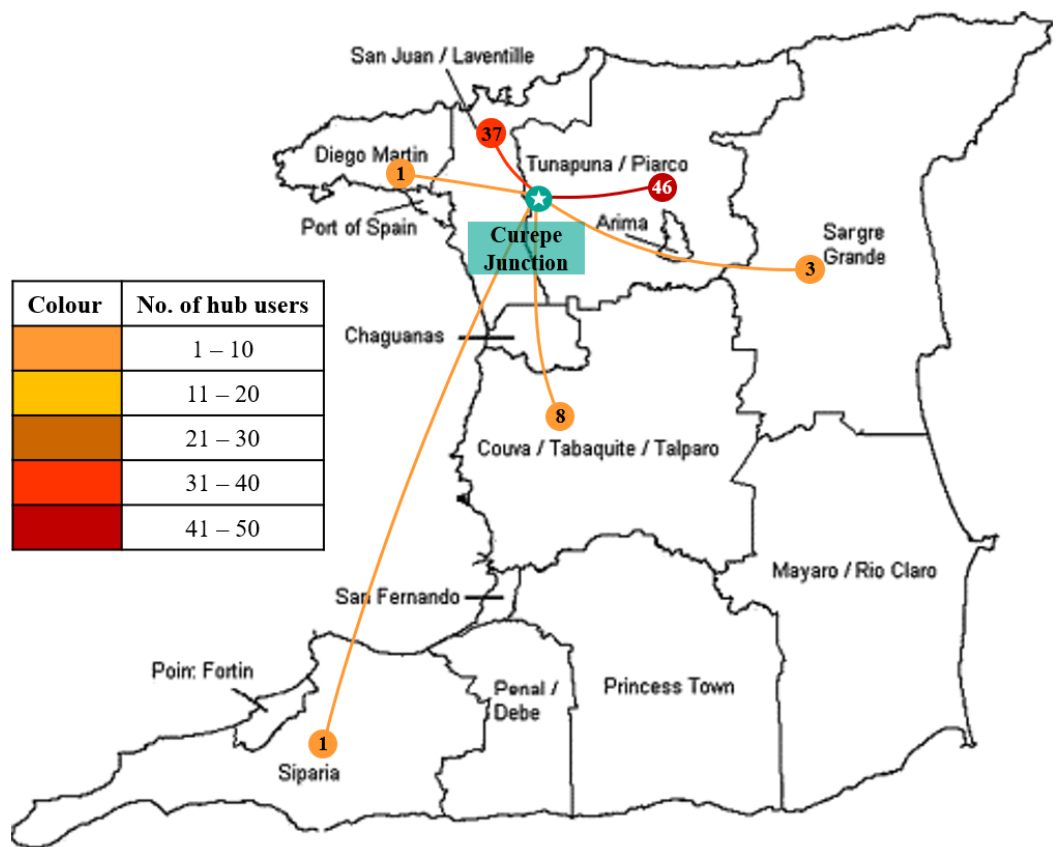


Figure 4.10: Sociodemographic data: Service areas

4.3.2 Perception of Curepe Junction

This research is based on the hub user's point of view of Curepe; thus, the first question targeted their general attitude towards Curepe Junction. This question was intentionally vague to encourage a range of answers. However, ironically, the majority of the responses were similar, addressing the amenities, safety concerns, and tone of Curepe. Below presents the reoccurring attributes of Curepe Junction, as expressed by the hub users, with the bold and uppercase words being the most prevalent responses.

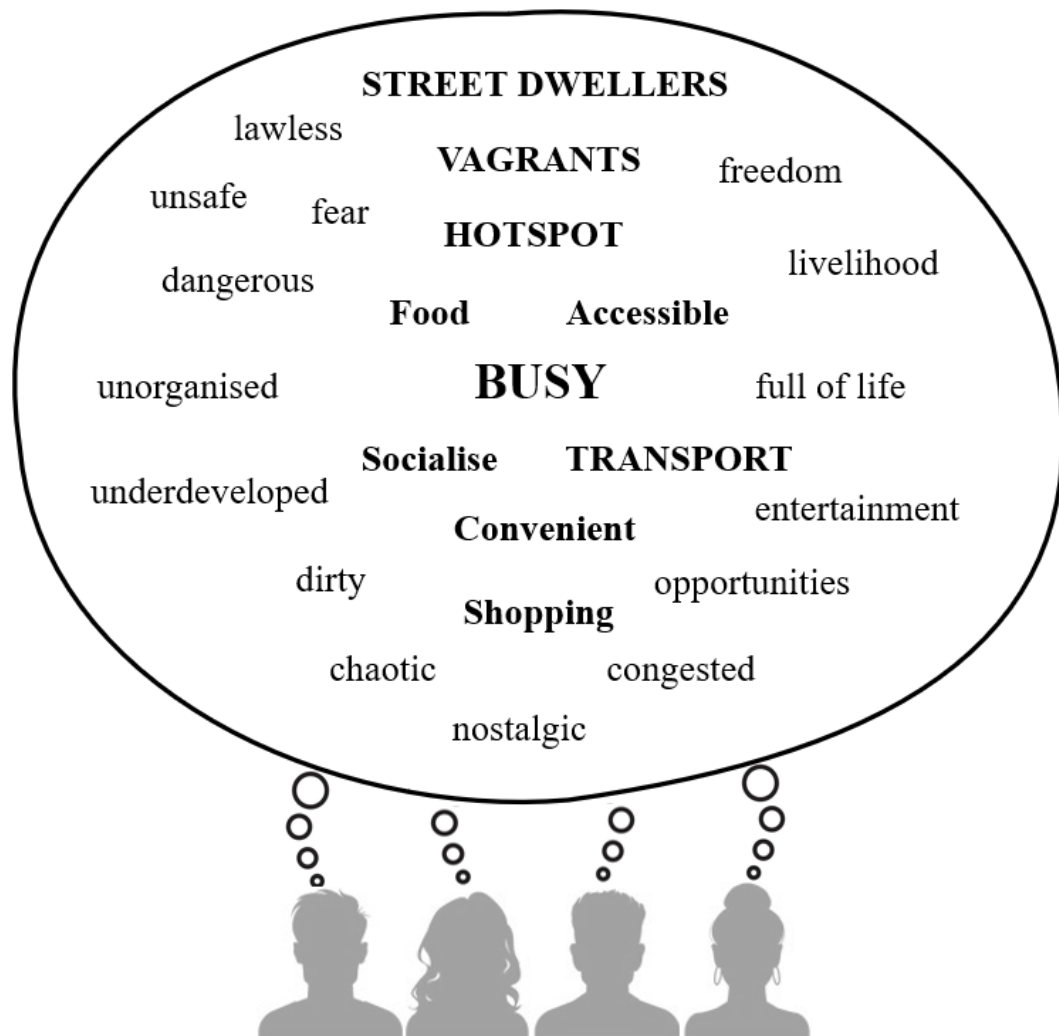


Figure 4.11: Key perceptions of Curepe Junction

When asked the purpose of their trip, predictably, 40% of the responses were using the transport services found throughout Curepe. It is important to note that only one female visited Curepe to relax and socialise and later rated her feeling of safety as acceptable. This was a rare response from a female's perspective compared to the accumulated data from the other females during the surveys.

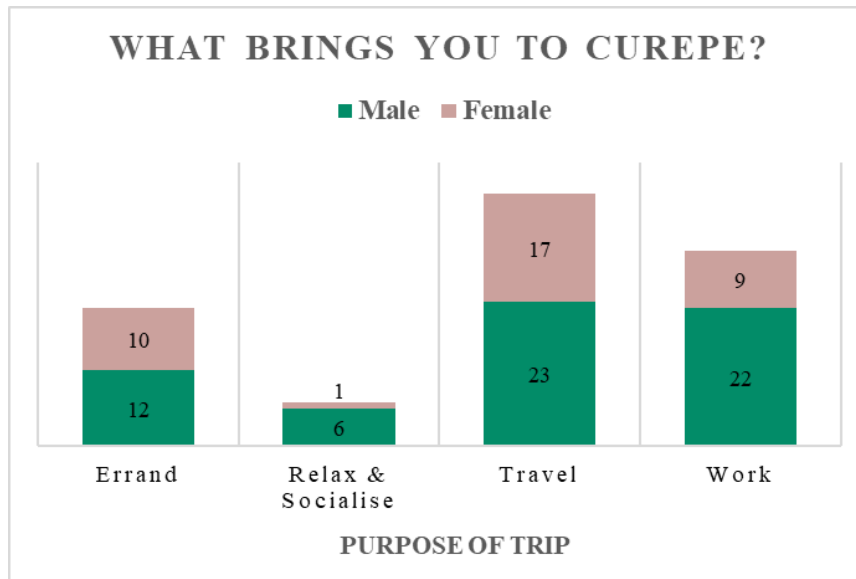


Figure 4.12: Purpose of trip

In terms of Curepe Junction being pedestrian-friendly, 52% of the hub users deemed the junction not pedestrian-friendly. The remaining 48% said that even though the pedestrian facilities were unsatisfactory, and upgrades were needed, the people of Curepe and the overall atmosphere made them feel welcome. This response coincided with the researcher's observation of the area, where the hub users made the furnishings work for them, as best as they could, and were generally pleasant to one another, which contributed to the overall tolerable pedestrian experience. Regarding riding a bicycle through Curepe Junction, 83% of the hub users would rather walk or drive through the area, regardless of proper and secure biking facilities. This eliminates the need for biking accommodations throughout the junction, which ironically is a common inclusion to hubs in international design guidebooks (City of Boston. BTP 2013; The City of Calgary. CTD 2014; NACTO 2016).

4.3.3 Perception of the Elements of Curepe Junction

The hub users were asked to rate 17 TEUD elements throughout Curepe Junction. The charts below detail the responses of each element, pinpointing the overall predominant ranking per element, depicted in Figure 4.13. To further explore trends between the demographics, this overall predominant ranking was then compared with predominant ranking amongst the responders' age groups and gender, presented in Figure 4.14 and Figure 4.15 respectively.

According to Decker (2018), Likert data should never be averaged but preferably summarised by determining the most recurring ranking. This technique justly reflects the feedback because the responses are ranked on a five-point numbering scale for convenience and are then converted to the user's agreement or disagreement on an item. Values were only averaged when the most frequently rank were equally split. For example, in Figure 4.14, the connectivity element for the 51 to 70 age group was ranked 3.5 because 13 people voted for an acceptable connectivity and 13 people voted for Curepe Junction having good connectivity.

Predictably, hub users ranked 10 of the 17 elements as overall acceptable. This could be because change and development are so uncommon to Curepe that pedestrians have accepted how things are. Either way, people traditionally tend to offer neutral responses, especially for busy hub users who may not feel passionate about certain aspects of Curepe Junction. Even though some of these hub users generally gave very surface-level responses for the remaining questions, some further expressed their views on the latter questions, which varied slightly from their original ranking. Thus, even though a Likert scale and yes/ no questions are expeditious and straightforward for such scenarios covered in this research, it is good practice to include open-ended questions that further touched on the main elements the researcher wishes to examine.

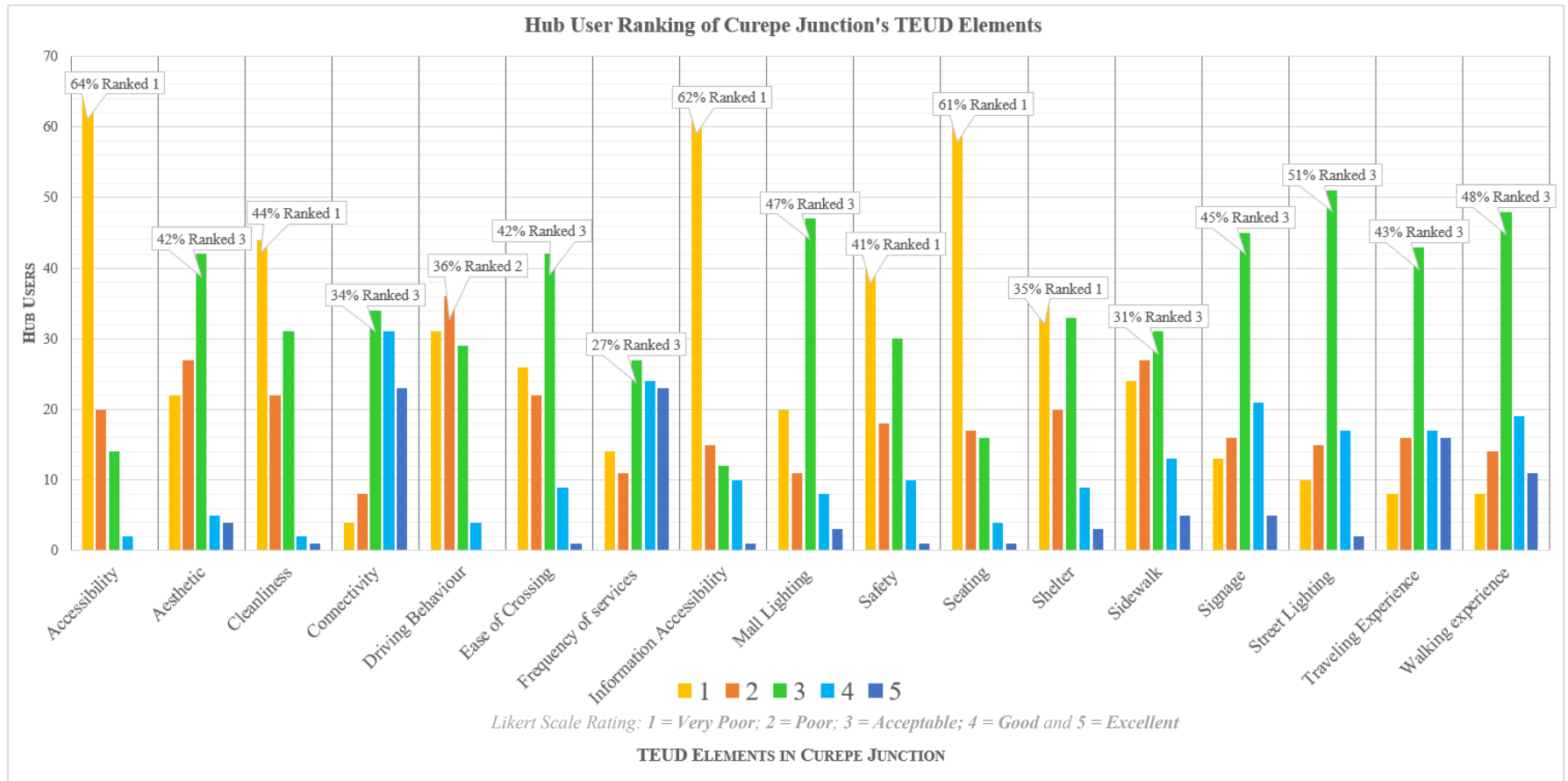


Figure 4.13: TEUD element ranking

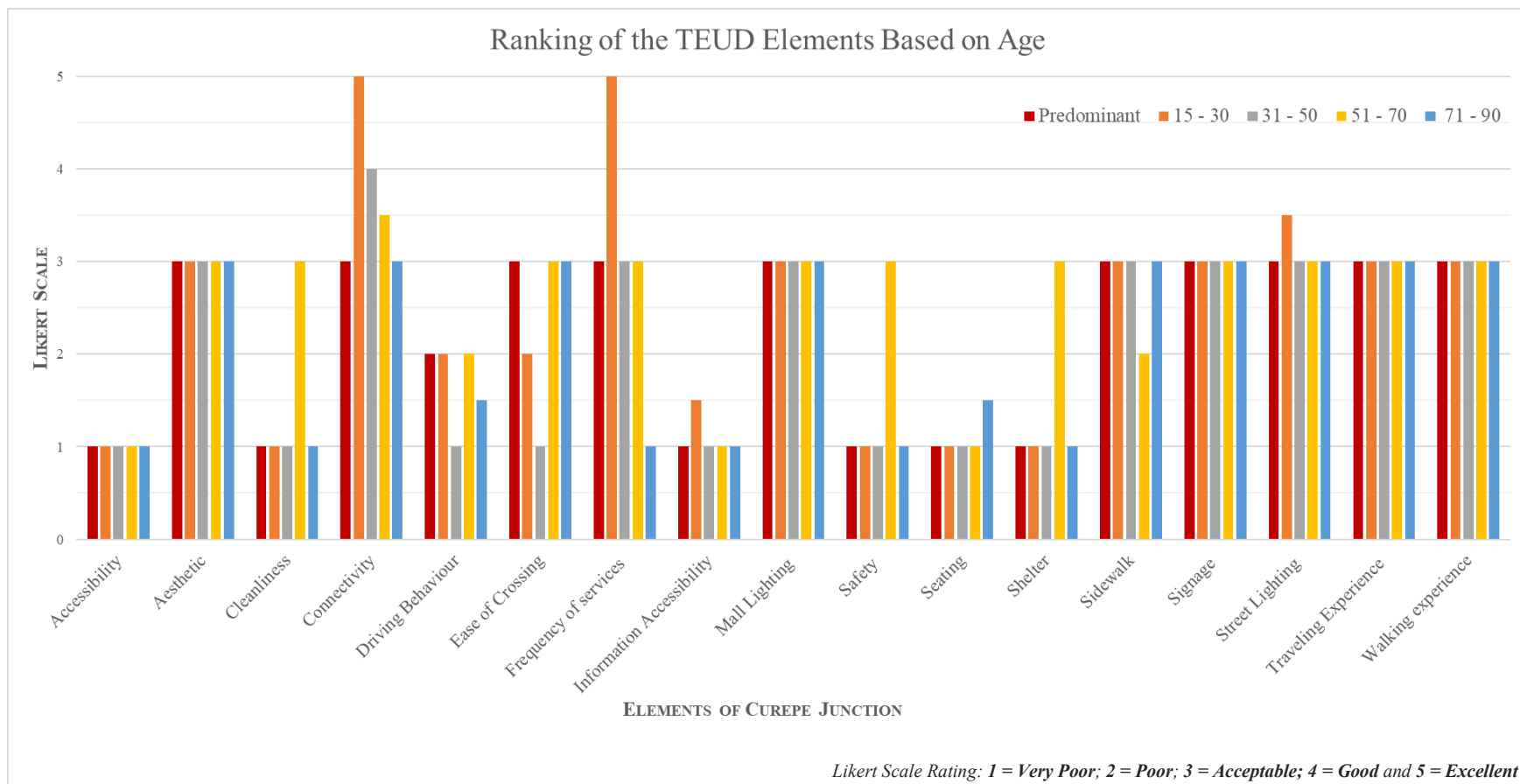


Figure 4.14: TEUD element ranking based on age

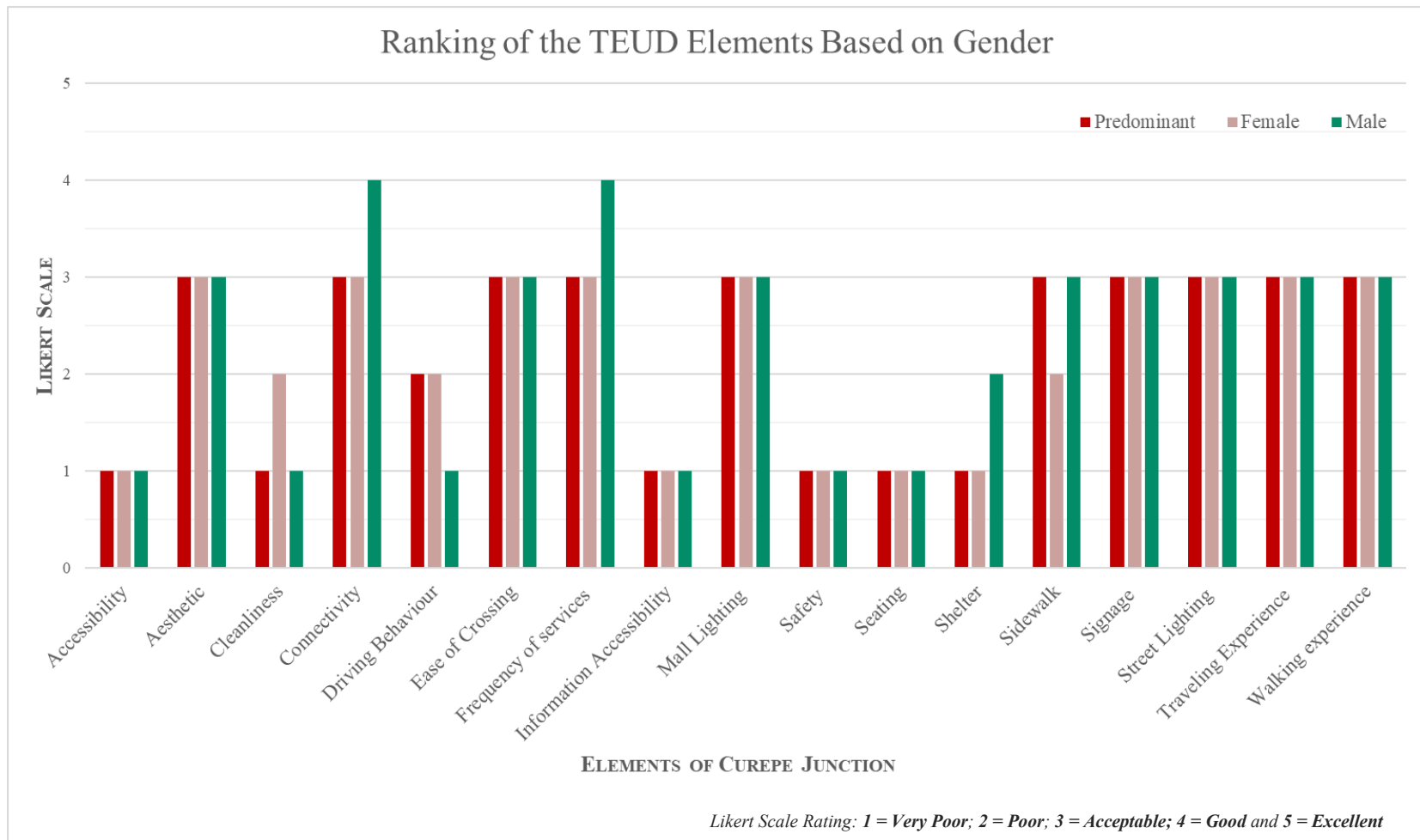


Figure 4.15:TEUD element ranking based on gender

Below elaborates on the overall elements, predominantly ranked below 3 in the charts above, deeming these elements as problematic and would be addressed in the redesign of Curepe Junction.

4.3.3.1 Accessibility

Regarding accessibility for the elderly and people with disabilities, it was clear that Curepe Junction does not adequately cater to such hub users. 64% of pedestrians ranked this element as very poor. This score was predominant regardless of age or gender. The younger pedestrians stated that they often need to assist the disabled and older hub users because the facilities around Curepe are virtually non-existent. Many older hub users complained that the ramps leading to the CTM lead to stairs, which defeated the purpose of the ramps. Additionally, aside from the poorly designed and vendor-blocked ramps, many hub users commented on the uneven and dangerous sidewalks with exposed and broken manhole covers. Even highlighting the hazardous drainage drops and overall discontinuity of sidewalks throughout the hub, forcing them to walk along the roads.

On conversing with a visually impaired traveller, he indicated the presence of no audio indicators throughout Curepe that would ideally allow him to manoeuvre through Curepe freely. Instead, he must rely on a sighted person to assist him. Based on initial observations, it came as no surprise that this element ranked low, for these inconveniences can be frustrating and make for a very daunting and unpleasant commute; thus, this item must be addressed in the design guidelines.

4.3.3.2 Cleanliness

44% of people ranked the cleanliness of Curepe Junction as very poor, with 31% of people ranking the cleanliness as acceptable, predominantly from the 51 – 70 age group, and the majority of the female responders ranking the cleanliness as poor. These varied responses could be based on the days the interviews were done, where the county recently cleaned, and where the interviewer was standing. The

majority of the 51 – 70 age group was found around the CTM, which was generally kept clean, hence their response.

Based on the observed space and the key perception responses of Curepe referencing the space as “dirty and smelly,” it was anticipated that majority of the hub users would rank this element low. The cleanliness and maintenance of the junction require consistency.

4.3.3.3 Driving Behaviour

This element questions the pedestrian’s view on the drivers’ behaviour as they attempt to cross the street. The driving behaviour element was perceived by 36% of the responders as poor, and 31% as very poor. As mentioned previously, pedestrians often jaywalk throughout Curepe, due to malfunctioning signalised crossings or insufficient crosswalks, creating a clash between modes on the road. Hub users were very vocal when asked to elaborate on why they ranked this element low, stating that Curepe can be very dangerous to people on foot and better facilities need to be implemented to protect the pedestrians.

When asked about the pedestrians crossing habits, 54% admitted to crossing wherever and whenever they got the chance, while 28% claimed to use the crosswalk sometimes when working but would quicker resort to jaywalking. Some hub users even questioned the locations of the crosswalks, noting that most of the road markings were faded and not placed more frequently. Since crossing the streets of Curepe was such a task, the hub users were asked if they thought a walkover would be beneficial. Unfortunately, 73% of the pedestrians disagreed, stating that it would be a waste of infrastructure and would cross whenever they got a chance.

This high percentage of negative responses must be addressed in redesigning the space to satisfy the 52% of hub users that deemed Curepe Junction as automobile-centric and make the Curepe Junction work for all its users. Since a pedestrian overpass design was eliminated, the guidelines must cater for an effective means to protect the pedestrians and not cause any further delays to the drivers.

4.3.3.4 Information Accessibility

Throughout the junction, the lack of transportation services information made this element the second-highest ranked element voted as “very poor”. The hub users stating that people working in the CTM are often clueless and are of no help. Novelty travellers seek information directly from the drivers of the transport services or people waiting for transport.

Generally, people visiting Curepe know their way around, or have some idea of the layout. Even though the CTM station signage is visible, the commuters complained about its poor positioning, sizing, and schedules and mapped routes. Additionally, travellers stated that the buses and maxis do not comply with the guides available via the Public Transport Service Corporation (PTSC) of Trinidad and Tobago’s website.

In addition to travel routes, travellers commented that the CTM does not supply tickets for the PTSC buses and mentioned that they must cross the ever-busy EMR to purchase their passes. These inconveniences suggest that facilities and accommodations must be made to make the hub users’ commute smoother.

4.3.3.5 Safety

59% of the responders deemed Curepe Junction unsafe, while 30% ranked their safety throughout Curepe as acceptable, with the caveat being solely during daylight. This acceptable ranking primarily originates from the 51 – 70 age grouping, who limit their movement around the CTM. This response was expected based on the data received from CAPA and the news reports about Curepe Junction.

The hub users suggested that more police presence be implemented, questioning why the mobile police unit stationed at the hub was removed a few years ago. Upon interviewing the Sergeant at the St. Joseph Police Station, just 500m from the hub, he noted that the mobile unit was simply a temporary fixture and is dispatched on an as-needed basis.

After expressing the outcry by the hub users for more on foot police patrols within the junction, he stated that they currently do not have the manpower but noted that they conduct random patrols during the morning and lunch periods. However, for the duration of the study period of Curepe, the latter was not observed.

4.3.3.6 Seating

Accessibility to comfortable and convenient seating accommodations was the third-highest ranked element voted as “very poor.” Proper seating accommodations were only provided within the CTM, which faced away from the PBR. Travellers noted that they often had to leave their seats every couple of minutes to check on the arrival of their transport, so most times, they preferred to stand and wait, in fear of missing their ride. The only seating accommodations available along the PBR were the red bars discussed in Section 4.2.2 The Furnishings.

4.3.3.7 Shelter

Shelter from the sun and rain throughout the junction was deemed very poor by 35% of the hub users, with a close 33% of the hub users ranking the shelter as accessible. Similar to the cleanliness element, this response varied based on the location of the interview. Excluding the comfort of the CTM’s shelter, people caught in the rain were often stranded hovering outside of the commercial buildings, which were often awning-free.

Pedestrians mentioned that they were frequently chased from sheltering within commercial spaces, leaving them exposed to the elements. Upon further discussions with people within these commercial spaces, the awning-free design, even though it would shelter innocent hub users, they would encourage street dwellers to seek refuge and litter their storefront spaces, deterring potential customers. Thus, an innovative approach is needed to address the shelter issues, satisfying the pedestrians and the businesses.

4.3.3.8 Other Elements

There were noteworthy positive attributes of Curepe Junction, such as the connectivity of the space and the frequency of transportation services. The consensus was that the layout of Curepe Junction allowed for good pedestrian flow. From exiting buses at the PBR to accessing taxis, private vehicles, and businesses within walking distance from the CTM. They agreed that improvements were needed for the hub to function as intended. However, 91% of the hub users naturally considered themselves a way-finder, meaning that regardless of the signage and accessibility issues, they can improvise and get where they need to be.

4.3.4 Perception of Convenience

Based on the SSI responses, 45% of the hub users preferred to walk no more than 5 minutes to facilities around Curepe. As expected, the most frequented locations were food and baked goods, groceries, and pharmacy. Upon reviewing the layout of the space, referencing Figure 4.6, these places of interest centre around the CTM.

Additionally, even though the hub users consider the junction convenient and often patronise the businesses in the area, they were asked what inclusions they would implement to the junction. The most common responses were for better dining and shopping options, noting that the current businesses were very unappealing and often filthy. Younger hub users suggested accommodations for recreational activities such as an arcade or training facility. The older hub users suggested the addition of government agencies to facilitate day to day transactions at such a central location as Curepe.

70% of the hub users were unaware of the businesses within the CTM. They described the mall as uninviting, admitting to using the ground floor as a thoroughfare. The mall can accommodate 30 tenants, but only 10 of the 30 units were occupied. Upon further communications with a CTM vendor, occupying her booth for almost 30 years, potential vendors are deterred by the low foot traffic

throughout the mall and the ever-increasing rent. She emphasised that for her, the mall is convenient and safe.

On the contrary, when conversing with street vendors about occupying a unit within the CTM, they stated that they were sceptical about the affordability of the commercial spaces and were unfamiliar with the application process.

The CTM has potential, and with the encouragement and guidance from such optimistic CTM's tenants, the space can fulfil some of the requests from the hub users for added facilities within the junction and reclaim the sidewalks for pedestrians. This improvement can embody the Portals to Places concept, prioritising the basic needs of the hub users within a five-minute walking radius from the hub.

4.3.4.1 Walkability of Curepe Junction

The following section determines the walkability of Curepe Junction, loosely mimicking the patented Walk Score (2007) and The Partnership for a Walkable America (2015). This Walkability Assessment Toolkit (WAT) was developed to determine a quick and simple check for Curepe Junction.

- **Step 1:** Determine the comfortable walking time for the hub users.

Based on the SSI, the preferred walking time was *5 minutes or less*.

- **Step 2:** Rank the proximity of the following amenities from 1 – 5. The highest score, 5, is given to amenities within 5 minutes or less from the CTM. The nodes of interest determined by the hub users.

For example, 30% of the hub users mentioned St. Mary's Bakery as a go-to destination; thus, the bakery is a node of interest. St. Mary's Bakery is just across the EMR from the CTM; thus, the score is 5.

Table 7: WAT: Nodes of interest score

Nodes Of Interest	Score
Bakery	5
Banking Facility	5
Bar	5
Food/ Restaurant	5
Grocery/ Produce	4
Healthcare	5
Home Store	3
Shopping and Personal Care	4
Utilities/ Government Services	5
TOTAL:	41 out of 45

- **Step 3:** Allow the hub users to rank the current walking facilities. The predominant scores, detailed previously in Figure 4.13, highlight the highest score, 5, as favourable/ excellent walking conditions.

Table 8: WAT: Walking facilities

Walking Facilities	Score
Accessibility	1
Connectivity	3
Driving Behaviour	2
Ease of Crossing	3
Mall Lighting	3
Safety	1
Seating	1
Shelter	1
Sidewalk	3
Street Lighting	3
Walking experience	3
TOTAL:	24 out of 55

- **Step 4:** Determine the walk score.

$$\frac{\text{Calculated Score}}{\text{Total Score}} \times 100 = \frac{41+24}{45+55} \times 100 = \mathbf{65}$$

Based on the calculated data above and the Walk Score[®] table below, the Walk Score of Curepe Junction is 65, meaning the space is somewhat walkable, where some of life's activities can be accomplished on foot within a 5-minute radius.

Walk Score®	Description
90-100	Walker's Paradise Daily errands do not require a car.
70-89	Very Walkable Most errands can be accomplished on foot.
50-69	Somewhat Walkable Some errands can be accomplished on foot.
25-49	Car-Dependent Most errands require a car.
0-24	Car-Dependent Almost all errands require a car.

Figure 4.16: Walk Score® ranking

Source: Walk Score (2007)

4.3.5 Perception of Historical Preservation and Aesthetics

In Curepe, the only homage to its origins is an unnoticed plaque within the CTM that only 3% of the interviewed were knowledgeable of. The fascinating evolution of transport services in Trinidad are not celebrated throughout such central hubs as Curepe Junction. Many of the older hub users mentioned the “good old days” and expressed their compassion for the younger generation, who are not privy to such historical information. 67% of the hub users indicated that they were unaware of the origins of Curepe Junction, and 87% of the total hub users expressed their desire to have some form of historic preservation celebrated throughout the hub.

When discussing the aesthetic of Curepe Junction, 43% of the hub users ranked the appearance as just acceptable, with an outstanding 80% of the hub users expressing their desire to see more greenery added to the junction, whether it is for shade, fruit trees to feed the wildlife and socially displaced, or just for added curbside appeal. Aside from curbside beauty, 87% of the hub users stated that the recent CTM paint job uplifted their mood while travelling and brightened the dull Curepe Junction. Overall, the majority of the interviewees wish to see more art added to beautify the hub. Some beautification suggestions were to celebrate local art along the walls of the PBR leading up to the CTM, functioning as a point of reference for travellers, alerting them that their stop is approaching.

In correlation to appearance, overall cleanliness plays a pivotal contributing factor. The significant components hampering the cleanliness of the junction are the garbage and drainage issues experienced throughout the hub due to the socially displaced and poor maintenance by the Regional Corporation. The hub users pointed out the wickedness of the homeless who roam the hub, stating that they litter and scatter the garbage, often purposely clogging the manhole covers and drains. This malicious behaviour encourages vermin and flooding, emitting foul scents throughout the hub. This deterrent has severe ramifications on businesses and livelihood, often discouraging people from venturing throughout the hub. 92% of the interviewees expressed the need to rectify this issue by implementing design features, often referred to as hostile architecture, to deter the homeless from destroying Curepe Junction. The remaining 8% understands that something must be done to improve the space but suggests developing a collective organisation to relocate and assist these street dwellers. Surprisingly, irrespective of the abovementioned concerns, an unexpected 49% of the hub users stated that they would still visit the hub during their leisure. Expressing that the hub still attracts them for food, socialising or even just relaxing and taking in the activities. Even though the poll was divided, the statistic demonstrates the appeal and the potential of Curepe Junction when redefined.

4.3.6 Perception of Change

One of the main gaps in the development of hubs in Trinidad and Tobago is the lack of user involvement and transparency in the development process. When questioned if the hub users were ever surveyed, 95% stated that they had not, while 5% stated that the surveys they participated in focused on acquiring sociodemographic information.

Regarding formal communication, if the hub users had issues with Curepe, 90% did not know where to go or whom to address. Out of the remaining 10%, only one person made a formal suggestion to the councillor to repaint the CTM.

Regarding hub users' involvement towards future development, 40% declined. They believed that it would be a waste of their time, or by the time their suggestions became a reality, they would be long gone before they experience it.

The remaining 60% expressed their keen interest in participating in change, ideally suggesting community meetings to keep abreast of plans and weigh in on issues they have experienced. When asked why it was important for the hub users to have a say, the most common responses and reoccurring themes are presented below.

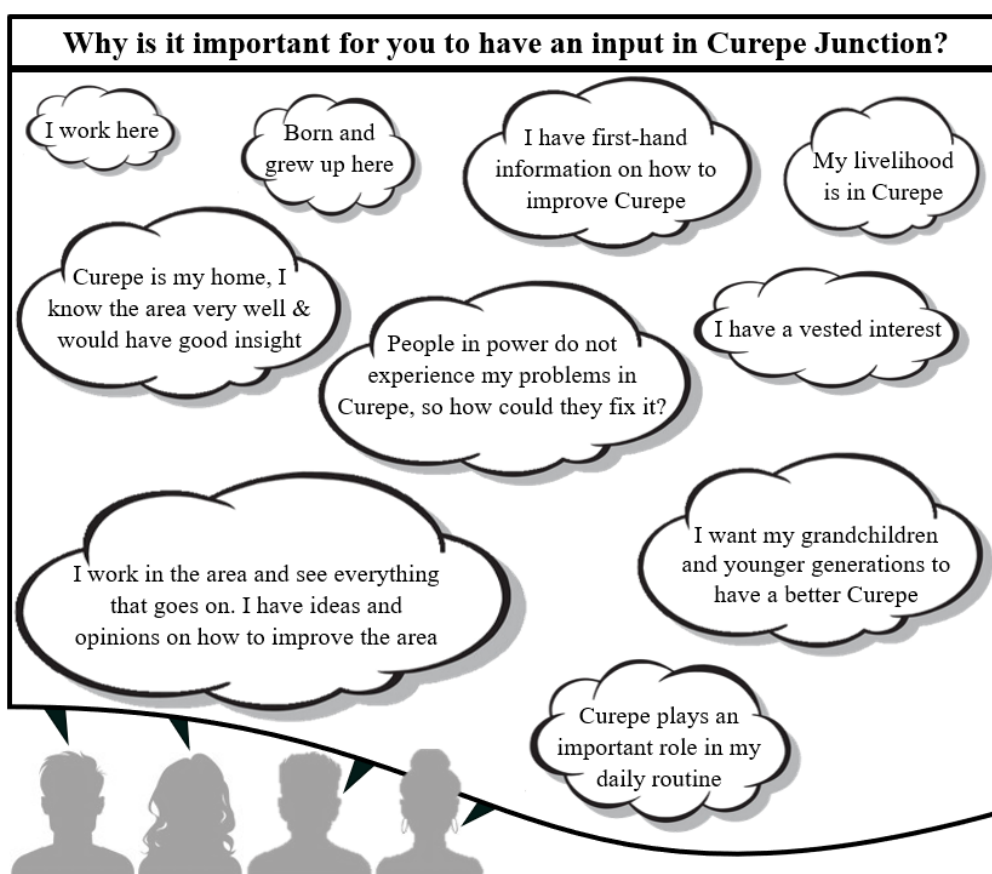


Figure 4.17: Importance of input by the hub users

Based on the responses in the figure above, it is evident that the most qualified people who should inform the redesign of any space are the people who have the most involvement with the space itself. The commuters, the workers, the businesses owners, and the residence are the people who have experienced every

flaw and strength within the study area. Thus, concluding that a researcher/ bystander cannot accurately interpret the problematic elements within a study area by oneself.

4.4 Summarising the problematic TEUD Elements

Overall, based on the charts and discussions above, it is interpreted that the issues faced by the hub users are predominantly universal, regardless of the hub user's age, gender, and background. Below summarises the problematic TEUD elements that would be addressed in the following chapter.

- **The People** - Even though there is a sense of community, some hub users sensed a disconnect between the different social groups. Community building tactics can prove beneficial. In addition to strengthening the community feel within Curepe, the major concern that must be addressed is the crime and abundance of illegal activities that occur in the area.
- **The Furnishings** - There were many minor furnishing issues addressed above, such as the lack of shelter, visual appeal, maintenance, seating accommodations, signage, and information accessibility within the CTM, to name a few, that collectively compromised the overall user experience. This TEUD element catered for most of the issues faced by the hub users within the hub, deeming it the most problematic core element.
- **The Network** – The immediate concern from the hub users regarding the network was the poorly designed and damaged sidewalks. They stressed that the redesign must be safer and more accessible for all hub users. The crosswalk facilities also need to be revised to reduce/ eliminate potentially dangerous jaywalking behaviours. Apart from the pedestrian network, accommodations should be made for parking facilities and a designated bus bay to mitigate the delays along the main roads.

CHAPTER 5

CUREPE DESIGN GUIDELINES

This chapter aims to develop design guidelines utilising the theories and concepts considered throughout this research to address the problematic elements identified by the hub users. The following sections present guidelines to improve and redesign the three core TEUD elements: The People, The Furnishings and The Network.

The following are the key sources of material used to develop the guidelines:

- Guide to Developers and Applicants for Planning Permission (1988)
- Boston Complete Street (2013)
- Trinidad and Tobago Highway Code (2013)
- Urban Street Design Guide (2013)
- Calgary Transportation Plan and Complete Streets (2014)
- Motor Vehicles and Road Traffic Act Chapter 48:50 (2016)
- Transit Street Design Guide (2016)
- A Policy on Geometric Design of Highways and Streets (2018)
- San Francisco Urban Design Guidelines (2018)
- Traffic Signs Manual (2021)
- Project for Public Spaces (2021a)
- What Makes a Successful Place? (2021b)

5.1 Building a Community

The hub users, specifically the people who work and live in the area, indicated that Curepe lacked a sense of community and disconnect in communication. Additionally, they had creative ideas and suggestions to improve the hub but did not know to whom to address their concerns. The CDG suggests establishing committees and cooperatives such as:

1. The Curepe Business Committee – In charge of providing a platform for business owners and employees of the Curepe to express their concerns.
2. The Traveller and Residential Committee - In charge of providing a platform for regular travellers and residents of the Curepe to express their concerns.
3. The Curepe Hub Co-op – A collective of the above two groups where main concerns and problems can be resolved or addressed, that cannot be otherwise resolved in their respective committees. Issues such as late garbage collection, pests and rodent control, malfunctioning traffic/ pedestrian devices, broken and exposed manhole covers, and crime can be discussed. It would be beneficial to introduce liaisons within The Ministry of Rural Development and Local Government, Municipal Corporation, Curepe Junction's Councillor and the TTPS.

By developing such committees, with multiple stakeholders, a range of problems and solutions can be resolved. Once such committees and co-ops are established and functioning as an effective avenue to vocalize and resolve concerns, for this initiative to be sustainable, there must be a sense of community pride.

To foster such pride, members can partake in community building activities and tactics, such as:

1. Fundraisers to generate financial resources for community-based projects.
2. Beautification programs including ensuring the streets are litter-free, creating community art and minor maintenance of street furnishings.
3. Recreational activities such as card tournaments. Along the Brian Lara Promenade in Port of Spain, the older folks meet to play card games.
4. Workshops that can be held in CTM to share trades and crafts.
5. Mentorship programs to encourage and motivate the street dwellers of Curepe. These programs can be administered by business owners, longstanding tenants of the CTM and respected pillars of Curepe. The initiation of such programs can potentially reduce crime and congestion along the sidewalks.

The above-listed tactics are visually illustrated in Figure 5.1. An additional benefit of an enhanced sense of community, is the feeling of safety. Two main perceptions of Curepe Junction were fear and unsafe. By instilling a neighbourly environment, hub users can feel safer navigating through the hub, knowing they are in an area where the community shows pride in the hub and looks out for one another.

In addition to establishing a community, an increased presence of law enforcement was the most suggested improvement for Curepe Junction. The CDG suggests acquiring consistent and frequent police patrol to prohibit the lawless attitude of the hub, such as but not limited to delays in traffic due to illegal street parking; abrupt maxi stops and jaywalking; vandalism and littering; and illegal street vending.



Figure 5.1: Enhancing a sense of community

Source: Image (a) Elmaleh (2017); Image (b) Michigan Economic Development Corporation (2018); Image (d) Invasive (2019)

5.2 Improving the Furnishings

75% of hub users' recommendations were directed to improving the furnishings of Curepe. This section suggests features to improve and add furnishings to the hub to make the space work better for its users.

5.2.1 Signage and Accessibility

One of the major concerns was that the hub lacked accessibility, whether for information or features, to aid the elderly and differently-abled. This section details two categories of signage: traffic signs and information signs and recommending improvements for user accessibility.

5.2.1.1 Traffic Signs

The general design principles for traffic signs are that they should be:

1. Designed to meet foreseeable traffic conditions and speeds.
2. Suitably conspicuously designed and located so that they would engage the attention of drivers and pedestrians at a safe distance to enable them to take appropriate actions.
3. Instantly recognizable as traffic control devices.
4. Contain essential information as clearly as possible at a glance.
5. Legible at a sufficient distance to avoid averting the driver's eyes at angles beyond the line of sight.
6. Effective, regardless of the time of day and weather conditions.

Traffic signs throughout Curepe should be designed per the Trinidad and Tobago Highway Code (2013) and the Motor Vehicles and Road Traffic Act Chapter 48:50 (2016). Where current signs do not comply with the code, they should be reviewed. Recommended details for traffic signs can be found in Appendix C, inclusive of yellow globes, which should be installed at crosswalks away from signalised traffic. This ensures that sufficient warning is given to approaching drivers and guides the pedestrians at night.

5.2.1.2 Information Signs

Informative signs around Curepe are placed in obscure locations, often missed by the hub users. In addition to the poorly placed signs, there is an absence of signs regarding transport routes, schedules, cost of fares and nearby amenities. Despite 91% of the hub users identified as way-finders, unfamiliar travellers must rely on other hub users or their smart devices for assistance. Adapted from the Signage Guideline by The University of New South Wales (2016), the CDG recommends the following guidelines to encourage visitors to explore the hub on their own and make manoeuvring through Curepe more convenient and comfortable.

- For the installation and maintenance, signs should be:
 1. Glass Reinforced Plastic, or similar quality material, is recommended due to its vandal-proof features, as well as its high impact resistance.
 2. Positioned and erected so that they do not create a hazard.
 3. Cleaned regularly and kept in good condition.
 4. Removed and replaced immediately once the information on the sign is no longer relevant or outdated, or the sign becomes damaged or illegible.

- For the visibility of the signs, they should be:
 1. Adequately illuminated with natural or artificial light so that signs are legible at night or on gloomy days.
 2. Distinctly designed to engage the attention of the hub users and legible.
 3. Contain essential information as clearly as possible.

- For the positioning of the signs, they should be:
 1. Mounted as close as practicable to the observer's line of sight.
 2. Strategically located to allow hub users ample time after viewing the sign to make their decisions accordingly.
 3. Placed on permanent structures, however, if placed on moveable objects, such as doors, the change in position would not obstruct the purpose of the sign or cause it to be obscured.

Where current information signs, such as taxi route signs and CTM bus bay signs, do not meet the requirements listed above, they should be replaced, updated, or relocated according to the CDG. The table and images below represent conceptual ideas for informational signs that can aid travellers of Curepe Junction.

Table 9: Information sign placement

Figure Reference	Recommended Use/ Location
Figure 5.2	Route maps should be posted within the CTM. Not only in the form of a billboard within the mall, but available on pamphlets. The billboard map should have a “You are here” identifier, allowing the hub user to identify where they are at a glance.
Figure 5.3	An information checkpoint is recommended as soon as passengers exit the PBR and enter the CTM. Such information signs should illustrate the route/ system map, like Figure 5.2; locality map to pinpoint amenities in the area like groceries, pharmacy, and hardware; the CTM business directory; bus transfers, schedules, and fares.



Figure 5.2: Maxi-taxi route map

Source: The Public Transport Improvement Group of Trinidad & Tobago (2015)

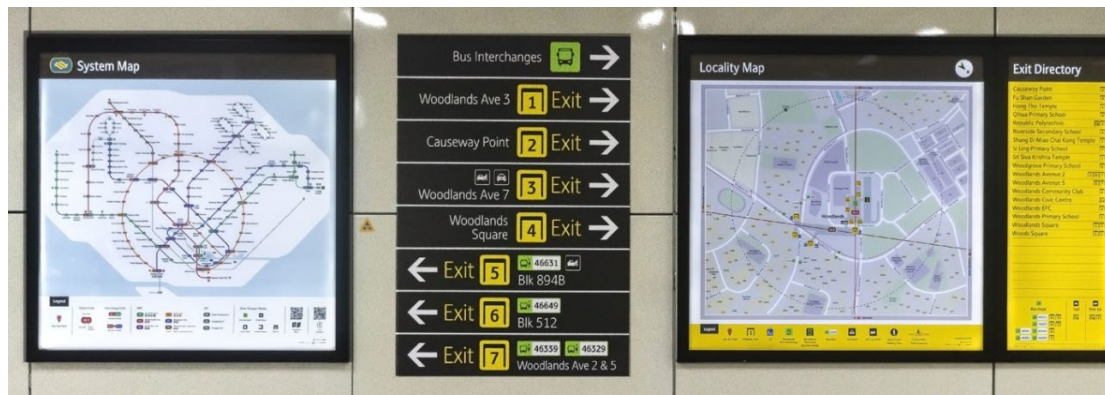


Figure 5.3: Information checkpoint

Source: Zhuang (2020)

5.2.1.3 Accessibility

Providing posted schedules may not always be a feasible option for all the public transportation modes throughout Curepe. Due to constant delays experienced by the hub users regarding the PTSC buses, provisions for information accessibility to its riders can be accommodated via the inclusion of a tracking application, similar to Uber or TT RideShare. PTSC or a third-party designer can develop this application to accommodate real-time public transportation tracking services. This service can be accessed via smartphones or digital screens within the CTM. Such recommendations can progress into providing the hub users with public Wi-Fi, charging ports and live radio broadcast within the hub, as illustrated below.



Figure 5.4: Intelligent transportation system: Bus shelter

Source: Adapted from The Freedom Press (2018) and Compare and Recycle (2019)

The design should promote an inclusive environment. The surveys and field observations identified Curepe’s ADA compliance shortcomings. A hub would not truly be accessible without its obligation to mandate ADA compliance. Thus, the CDG recommends the following accommodations targeted for the comfort of the elderly and disabled hub users.

5.2.2 Comfort and Image

5.2.2.1 Shading Elements

The heat, humidity and rain experienced at Curepe Junction can be very uncomfortable for pedestrians. The modern façade building designs further exacerbated the uncomfortable walking experience throughout Curepe. Business owners prefer these flat-faced building designs to discourage street dwellers, but at what cost to the hub users? Based on the hub user's feedback, there must be a compromise.

The CDG suggest including shading elements such as building overhangs, awnings and street trees with hostile architecture, illustrated below. Subtle hostile architecture techniques, such as raised cobblestones and tree barriers, facilitate functionality by allowing unimpeded pedestrian movement while prohibiting the socially displaced from sleeping and loitering around these shelter zones.



Figure 5.6: Streetscape: Shelter

Source: Adapted from Deniscristo (n.d.)

By controlling the microclimate of Curepe, pedestrians can comfortably shop and explore Curepe. This inclusion can boost businesses further from the transit hub and encourage the relocation and dispersion of street vendors. Thus, reducing the clutter surrounding the CTM and reclaiming the pedestrian zones along the sidewalks.

5.2.2.2 Greenscape Design

Including greenery, such as trees and shrubs, to streets, referred to as greenscape by Boston Transportation Department (2013, 47), can help foster an enjoyable pedestrian experience through the space whilst creating an aesthetically pleasing and sustainable environment. Introducing greenscaping into Curepe is a means of optimizing the use of the street space and reclaiming sidewalk space in the form of road/ lane diets. In addition to giving Curepe Junction character and shade, strategic greenscape designs can reduce energy consumption, stormwater build-up, and filter and absorb greenhouse gases and airborne pollutants. Greenscape designs can also balance the hostile design elements throughout the hub by providing fruit trees for the socially displaced, as suggested by the hub users.

The inclusion of greenscape design also acts as a traffic and pedestrian calming measure. Instead of traditional barricades and bollards, strategically placed greenscaping is an inexpensive and visually pleasing control tactic to guide pedestrian footpaths.

Thus, the CDG recommends the following:

1. Ensure the greenscape compliments the adjacent elements and do not obstruct features such as business entryways, pedestrian zones and should be a minimum of 3m from bus stop landing zones.
2. Include a “raised tree bed” designs outside the CTM, facing the PBR. There is an excess of space between the CTM and PBR. By introducing a lane diet, the space can comfortably accommodate greenscaping and seating. This design recommendation allows travellers to have an unobstructed view of the PBR, while providing shade and seating

accommodations. Thus, creating a relaxing and comfortable setting for captive transit users.

3. Ensure the design incorporates hostile architecture along the seats and is designed for a minimum recommended bed height of is 0.5m.
4. Activate the central median/ island along the EMR with plantings and/ street trees. Including greenscape along the EMR will restrict jaywalking and shift all pedestrian crossings to the designated crosswalks. Additional enforcement can be to include barricades bordering the centre median.
5. Introduce bioswales at curbs that experience ponding. Bioswales are shallow depressions in the landscape to capture, treat, and infiltrate stormwater runoff. The bioswale vegetation should be diverse, with minimum maintenance requirements.
6. Include fruit trees into the landscape to help feed the socially displaced.
7. Ensure all greenscape elements are well maintained to preserve visibility throughout the junction and discourage hotspots.
8. Ensure all trees and vegetation added are barricaded to prevent pedestrian interference.

Recommended local trees and conceptual images can be found in Appendix C.

5.2.2.3 Celebrating Character

Hubs of every community should showcase the unique character and culture of the area. The public realm should be not only inclusive and accessible but also interactive and engaging. Incorporating art at such a busy transportation hub like Curepe, entertains the captive transit users; thus, enhancing the overall pedestrian experience.

The following guidelines seek to incorporate public art to celebrate and enhance the character of Curepe Junction. The CDG recommends the following:

1. Before executing public art projects, committee meetings should be held to discuss and approve all potential projects with the respective artist/s. Additionally, committees can host yearly art competitions to inspire community involvement, preserving a designated wall for the winner to beautify.
2. Incorporate sanctioned public art along the PBR walls leading up to the CTM.
3. Incorporate sanctioned art, such as sculptures, paintings, and interactive art, within or along the CTM. Such displays of art can relay Curepe and/ Trinidad and Tobago's history and culture. These inclusions provide entertainment for the captive transit user, and also encourages passers-by to visit the CTM. Thus, establishing an inviting transit mall for potential business/ tenants.
4. Incorporate art along abandoned buildings throughout the hub.



Figure 5.7: Conceptual images for public art

Figure 5.7 presents conceptual images of public art around Trinidad and Tobago. The images range from ideas for parading competition winners to sculptures honouring Trinidad and Tobago's culture and achievements. The CTM can be embellished with similar visuals to showcasing the history of transportation services in Trinidad and Tobago, such as the trams and trolleybuses.

With the inclusion of public art throughout the hub, Curepe Junction can experience a plethora of opportunities and benefits such as:

1. Encourage and provide a constructive avenue for the younger generation to express themselves artistically.
2. Foster respect, stewardship, and pride towards the image of Curepe. Essentially, the greater the visual appeal of a space, the less inclined people are to litter and vandalise the space.
3. Encourage hub users to partake in community and committee activities.
4. Create conversational pieces, boosting the sociability of the hub.
5. Create educational opportunities, not only for the 87% of hub users who expressed their keen interest in the history of Curepe or past transportation systems, but for all future passers-by.
6. Strengthen the sui generis nature of Curepe Junction, allowing Curepe to be distinguishable from the other PTSC Transit Malls.

5.2.2.4 Litter Free Streets

The streets and drainage systems of Curepe Junction are consistently polluted by garbage. The litter is typically caused by socially displaced people scattering the garbage searching for food or littering by hub users. The CDG presents the following recommendations to improve the cleanliness of the hub, accompanied by conceptual images:

1. Strategically locate trash receptacles near crosswalks and bus stops.
2. Distributed garbage bins, at a maximum distance of 70m, along the streets of large commercial buildings, such as the CTM and Lot 29: TT Connect.
3. Ensure a clearing space of 0.5m around each bin is maintained.
4. Ensure all public bins are securely enclosed with flaring tops to limit/prohibit socially displaced people, rodents, and stray animals from easily accessing the garbage.
5. Ensure bins are securely bolted to the sidewalks. Such bins should rest on structural soil to allow for the treatment and infiltration of waste liquids.
6. Ensure bins are cleaned weekly to avoid still water build-up.



Figure 5.8: Conceptual images of garbage bins

Source: Image (a) ACC Recycling Division (n.d.); Image (b) Canova (2012); Image (c) Mill Valley (2015)

5.3 Redefining the Network

5.3.1 The Sidewalk

The CDG aims to connect the sidewalks and while ensuring the design complies with ADA requirements. Upon observing the footpaths of the hub users, the sidewalks often abruptly end, forcing the pedestrian to share the streets with drivers. This dangerous design, coupled with the poorly maintained sidewalk surfaces, resulted in hub users ranking this element problematic.

The CDG recommends the following improvements and inclusions for the sidewalks throughout Curepe, accompanied by conceptual images:

1. Ensure all sidewalk surface elements such as manhole covers and service boxes sits flush with the pedestrian walking path. Regularly maintain the surface elements, repairing and/ replacing damaged covers where necessary. If the damaged concrete manhole covers persist, consider using cast iron manhole cover.

In the theme of activating the sidewalks and celebrating the character of Curepe, popular footpaths, for example, from the CTM to the doubles vendors and Chaguanas maxi-taxi stands along Havlock Street, can be guided by ornate manhole covers, similar to the markers along the Freedom Trail, in Boston, Massachusetts. Localised versions can showcase national emblems and birds, or even imagery of past transportation services like the trams.

2. Ensure all major sidewalks, i.e. along the EMR, PBR and SMR, measure a clear minimum pedestrian zone width of 1.5m.
3. Ensure all minor sidewalks, i.e. along Riverside Road, Evans Street, Sellier Street and Broome Street, measure a clear minimum pedestrian zone width of 1.2m.
4. Ensure all the streets are equipped with sidewalks on either side, where applicable.

5. Ensure all curb openings for inlet drains have gratings to prevent unwanted debris and trash from entering the drainage system.



Figure 5.9: Conceptual images for sidewalk design

Source: Image (a) D. (2013); Image (b) Ma'ruf (2019)

5.3.2 The Crosswalk

Based on the findings, it is evident that the crosswalks throughout the hub needed upgrading and expanding to improve the flow of movement throughout the hub. The CDG recommends the following upgrades to the crosswalks throughout Curepe:

1. Ensure all major sidewalks are connected by marked crosswalks.
2. Each crosswalk at the signalised Curepe Junction should be equipped with the following:
 - Zebra crossing/ continental road markings, which should be installed at each leg of the signalised intersections.
 - Stop line at a minimum of 1.2m and a maximum of 9m distance from the approaching crosswalk.
 - Pedestrian crossing sign.

- ADA compliant pedestrian crossing street furniture, i.e., Accessible Pedestrian Signals.
3. Each crosswalk at an unsignalised locations should be equipped with the following:
 - Zebra crossing/ continental road markings.
 - Stop/ Yield lines at a minimum of 1.2m and a maximum of 9m from the approaching crosswalk for traffic speeds equal or less than 50km/h.
 - Stop/ Yield and Pedestrian crossing signs or Yellow Globe crossing street furniture.
 4. The inclusion of additional crosswalks at the high jaywalking zones identified is recommended. These additional crosswalks would decentralise the foot traffic experienced at the junction and declutter the sidewalks, allowing for a safer and more efficient means of crossing the streets in Curepe. These additional crosswalks should adhere to the above-listed guidelines for unsignalised locations and maintain a minimum distance of 60m from adjacent signalised intersections and crosswalks (City of Boston. BTP 2013, 179).
 5. Crosswalks should be a minimum width of 2.5m to 3m and outfitted with ADA-compliant curb ramps to allow for a smooth transition between the street/sidewalk interface. The cross-slope of the walking zone must not exceed 1.5%.
 6. Ensure all crosswalks are adequately lit.
 7. It is recommended to only implemented automatic pedestrian phases at Curepe Junction, due to the previously highlighted issues regarding the crossing pushbuttons for the actuated pedestrian phases.
 8. Incorporate safe pedestrian movement throughout the junction. This includes adjusting the vehicular signal phases throughout the junction to ensure pedestrians can access all points of the hub safely.

5.3.3 Bus Turnouts

Aside from jaywalking, the only other grievance experienced by the drivers of Curepe is the impromptu stops by maxi-taxis. Ideally, a bus stop should be located to facilitate the eastbound EMR travellers, near the CTM; however, no such bus stops are located along the EMR within the study area. In the absence of a designated bus stop, the public transport drivers stop where they see fit to accommodate their passengers. These impromptu stops become very problematic to the procession of traffic trailing the maxi-taxi.

The CDG proposes a bus turnout lane located at the far-side of Curepe Junction, i.e. immediately after an intersection. Turnouts, also referred to as bus bays, function to remove the bus from the travelled way and is preferred when space for expansion is limited. Partially open bus turnout design is recommended due to the following reasons:

1. They allow traffic to proceed along the travel route without delays.
2. They allow the buses to decelerate as it moves through the intersection to enter the bay, eliminating the need for a deceleration lane and reducing the taper entrance length.
3. They allow the buses to utilise the traffic signals to safely reenter the travelled way, reducing the required distance of the acceleration/merging lane.
4. The partially open design, i.e. the inclusion of a sidewalk extension versus an open bus bay, prevents other drivers from using the bus bay for overtaking and acceleration movements.
5. There is no need to relocate utilities and traffic signals at the curb.
6. They allow a safe, comfortable, and effective means of allowing travellers to board and alight the maxi-taxis.

The design requirements of a partially open bus turnout are detailed below and illustrated in Figure 5.10.

1. Stopping area length caters for the bus length with an additional 3m. The standard 12-seater small maxi-taxi is 5.5m. Therefore, the minimum stopping area length is 8.5m.
2. The minimum bus bay width to cater for a small maxi-taxi is 3m.
3. Taper exit length for a posted speed limit equal to or below 65km/h (40mph) uses the following formula (FHA 2012, Table 6C-4):

$$\text{Taper Length} = \frac{WS^2}{60}; \text{ where } W = \text{width of bay, feet}$$

S = posted speed limit, mph

$$TL = \frac{9.8 \times 30^2}{60}; \text{ where } W = 3\text{m or } 9.8\text{ft \& } S = 50\text{km/h or } 30\text{mph}$$

$$\text{Taper exit length} = 147\text{ft or } 45\text{m}$$

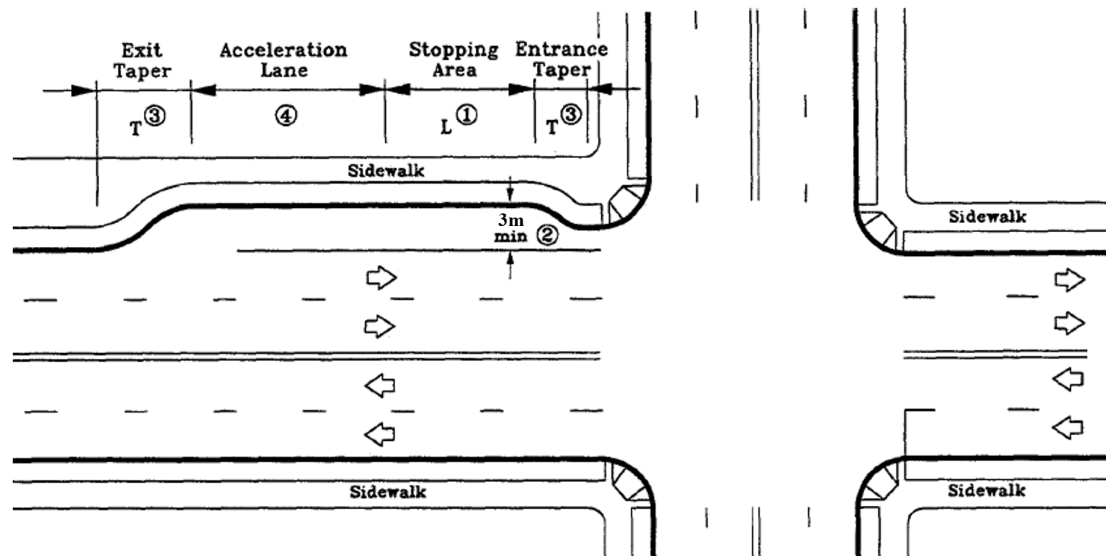


Figure 5.10: Partial open bus bay

Source: TCRP (1996, Fig. 7)

5.3.4 Road markings

Road markings are a form of visual aid for road users that improve traffic operations, road safety and driving comfort by improving the optical guidance of drivers. The general design principle for markings is that they should be:

1. Designed to suit the foreseeable traffic conditions and speeds on the roads.
2. Suitably conspicuous to engage the drivers at sufficient distances.
3. Designed to be easily interpreted in a timely manner to react accordingly.
4. Effective, regardless of weather conditions or time of day.

Road markings consist of both lines, such as “— — —” and words, such as “STOP”, and are often considered safer for drivers, due to its placement along the travelled path. There are two types of road marking categories:

1. Regulatory Markings - These prohibit or restrict movement or used for mandatory markings, such as stop lines or solid prohibit of lane change lines.
2. Guidance Markings - Used to aid drivers along the travelled path, such as the broken line indicating the centreline of lanes.

The road markers throughout the hub are faded and require regular maintenance to upkeep the operational quality this CDG set out to achieve. Below lists the guidelines for the road markers throughout Curepe.

1. Ensure all markings are white, except those of prohibitive or restrictive nature, such as the box intersection along the EMR, which should be yellow.
2. Hot Applied Thermoplastic Materials is the recommended material for regulatory road markings due to its effectiveness during wet surface conditions. All other road markings can use Road Marking Paint.
3. Longitudinal markings should be 0.1m thick, or unless stated otherwise, with a minimum length of 20m for continuous/ solid lines only.
4. Transverse markings should be 0.3m thick, or unless stated otherwise.

Road markings should be designed per the Motor Vehicles and Road Traffic Act Chapter 48:50 (2016). Where current markings do not comply with the code, they should be reviewed. Recommended details can be found in Appendix C.

5.3.5 Parking Accommodations

Illegal on-street parking is prominent throughout the hub, especially near the junction along the EMR and SMR. Even though most commercial buildings provide storefront parking, drivers are often conflicted on where to park because of the heavy foot and vehicular traffic. Drivers must decision whether to wait for a clearing on the sidewalk and park at the designated spots or illegally parallel park along the main road. Due to the lack of traffic warden presence, drivers often opt for the latter. This practice creates unnecessary congestion and bottlenecks near the junction.

The CDG recommends the following to accommodate for parking within the hub:

1. Ensure traffic wardens are present during peak hours to ensure the enforcement of the traffic laws, such as no street parking and pickup/drop-offs.
2. Ensure proper enforcement of TCPD guidelines concerning the provision of sufficient parking facilities for commercial spaces and ensuring commercial buildings setbacks comply with the Town and Country Planning Act. Chapter 35:01 (Republic of Trinidad and Tobago. TCPD 1988, sect. 5.7).
3. Develop empty lots, with the approval of landowners, to facilitate parking facilities. Once approved, these lots should accommodate park and ride options, encouraging more hub users to use public transportation. The parking facilities must be per Guide to Developers and Applicants for Planning Permission by TCPD (Republic of Trinidad and Tobago. TCPD 1988, sect. 5.10).

5.4 Maintenance

A robust maintenance program must be enforced to sustain the CDG. The committees and co-op must work in conjunction with the Tunapuna/ Piarco Regional Corporation to ensure the upkeep of the following maintenance and operation schedule:

1. Ensure the streets are cleaned weekly.
2. Ensure the garbage is collected three times a week.
3. Ensure the drainage infrastructure is cleaned and serviced bimonthly.
This includes cleaning silt traps and ensuring all manhole covers and grates are properly functioning to prohibit garbage from entering the drainage system.
4. Ensure greenscape maintenance, such as pruning, is done monthly.
5. Ensure pavement structure assessment is done biannual.
6. Ensure lane marking assessment is performed biannually.
7. Ensure sidewalk condition assessments are conducted biannual.
8. Ensure streetlights are maintained biannually.

The above list is a general guide for when maintenance works are typically required; however, improvement and repair works may be instantaneous and should occur on an as-needed basis, ensuring the safety and the quality of the junction.

CHAPTER 6

APPLICATION OF THE CUREPE DESIGN GUIDELINES

The following sections present the conceptual design and associated improvements throughout Curepe Junction. Each aspect of the design guidelines and other information discussed throughout the research, from the complete street ideology to the site analysis and hub user surveys, are all incorporated into the design described and shown within this section. The illustrations presented below represent the physical inclusions to the study area, as detailed in the CDG and are further discussed throughout this chapter.

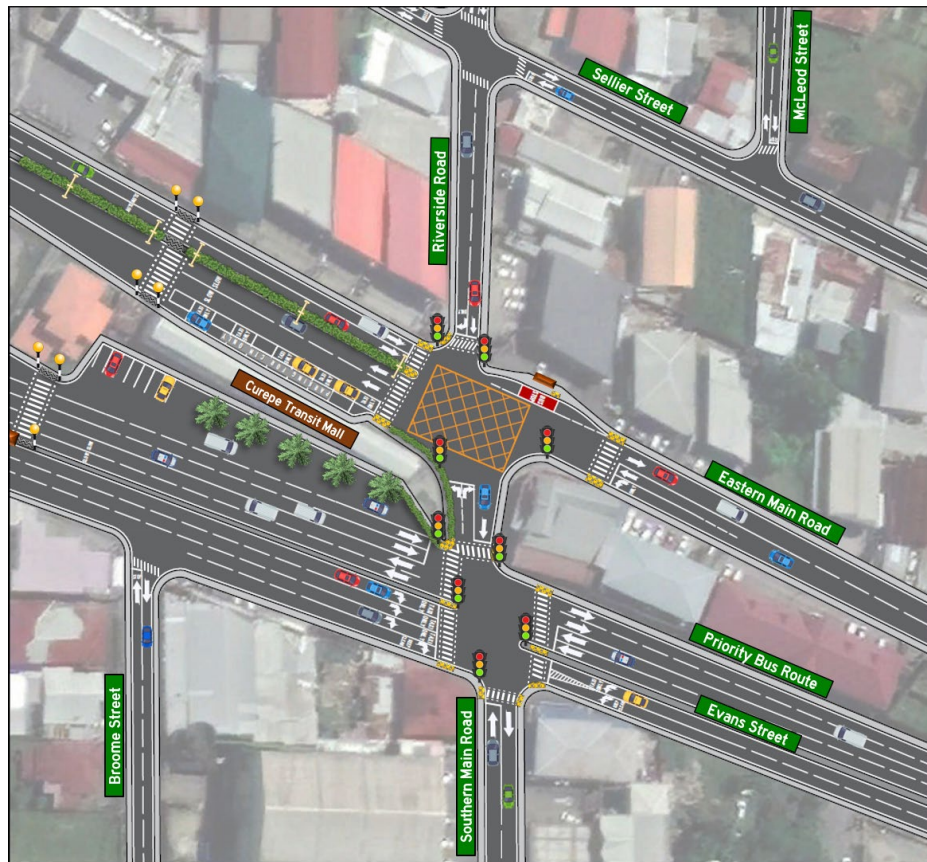


Figure 6.1: Redesign of Curepe Junction

6.1 Traffic Signs and Road Markings

Figure 6.2 presents the traffic signage placements, and Figure 6.3 presents the road marking details along the EMR. The illustrations include the additional crosswalk zone, outfitted with yellow globes, the proposed bus bay, and no stopping/no parking signs along the main road. Even though there are traffic signs littered throughout the study area, the placements of these signs are often missed or do not give the hub users sufficient time to react. The redesign ensures the traffic signs are relocated in a clear, unobstructed view for the drivers, per the CDG.

As shown, reduce speed warning signs and pavement markers were both placed before the unsignalised crosswalks. The inclusion of both signs and road markings increases the pedestrians' safety and allows the drivers sufficient warning and allotting appropriate reaction time to slow down and heed the potential hazard.

Regarding the road marking illustration, the labels, represented by "L-#" and "T-#" in Figure 6.3, references the line codes detailed in Appendix C.4. The proposed design catered for markings throughout the hub, such as parking zone designation and restrictions, as shown in Figure 6.1, guiding drivers and pedestrians to travel through the junction effectively.

In addition to ensuring the drivers are sufficiently warned with posted signs and markers, the redesign recommends introducing routine traffic wardens and/ facilitate wrecking services, especially near the intersection.

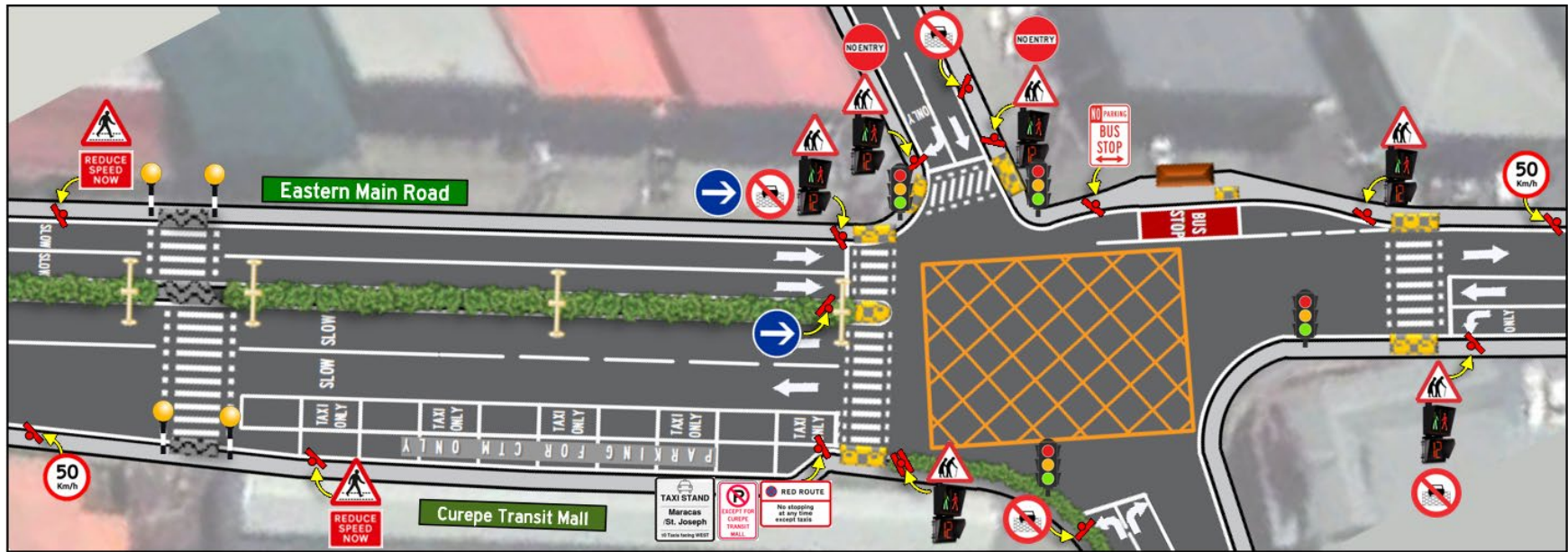


Figure 6.2: Signage along the EMR

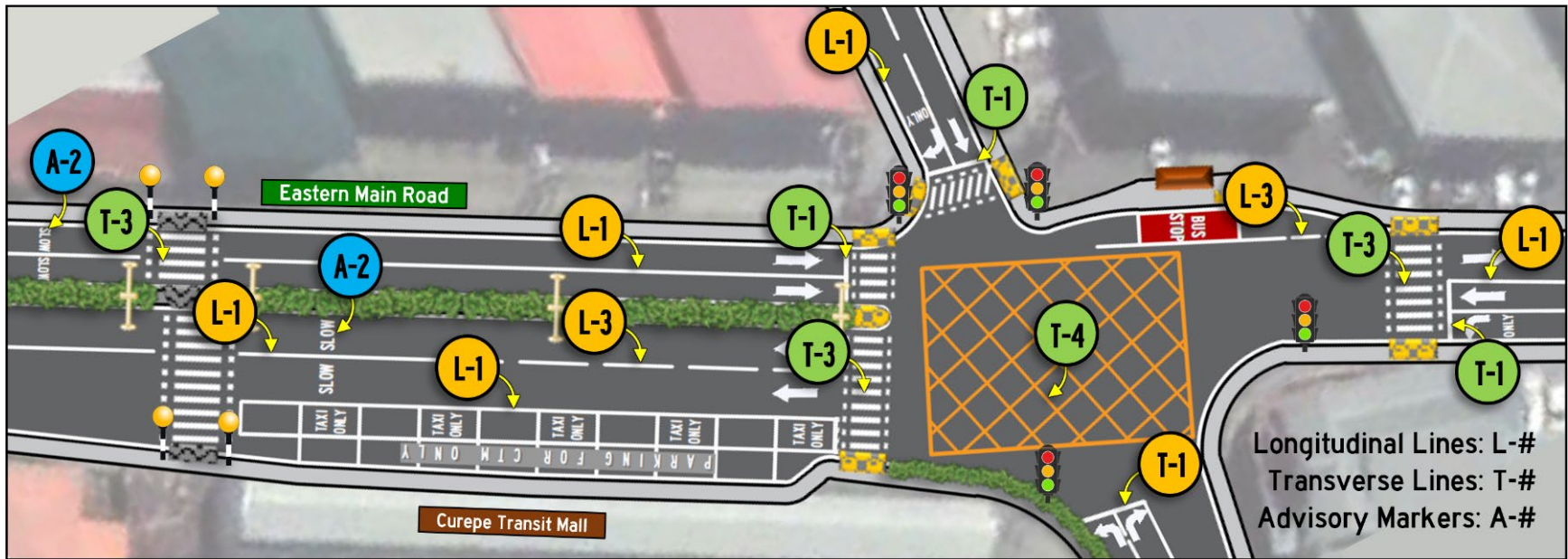


Figure 6.3: Road markings along the EMR

The redesigned map below highlights features added or improvements made to Curepe, discussed in detail below.



Figure 6.4: Itemised redesign of Curepe

6.2 Greenscape Design

- | | |
|---|--|
| 1 | <p>Centre median activated with strategically placed greenscape designs to prohibit pedestrians from crossing the EMR outside the designated crosswalk zones, illustrated in Figure 6.5.</p> |
| | <p>The design facilitates safe crossing zones for pedestrians and minimum delays for drivers.</p> |
| 2 | <p>This curb location was observed to experience the most street ponding; thus, a bioswale is added.</p> |
| | <p>The greenscaping added along the curb also prevents jaywalking.</p> |
| 3 | <p>Multifunctional greenscape design to accommodate shelter, seating and aesthetics for hub users around the CTM, illustrated in Figure 6.6.</p> |
| | <p>The design incorporates subtle elements of hostile architecture with the seating bars and curved design, on a raised seated platform.</p> |



Figure 6.5: Greenscape design: Activated EMR median



Figure 6.6: Greenscape design: CTM PBR seating

6.3 Sidewalk Design

- 4 The redesign ensures a pedestrian can walk to any point within the study zone without the need to share the road with vehicles, except at crosswalks.
- The sidewalk redesign caters for a clear pedestrian zone width of 1.5m for major roads and 1.2m for minor roads.

Figure 6.7 presents the proposed trash receptacle sites along the sidewalks throughout the study area. As shown, the sites are concentrated along the EMR and are located at every crosswalk throughout the hub. This placement allows pedestrians to conveniently discard their garbage regardless of where they are in Curepe Junction.

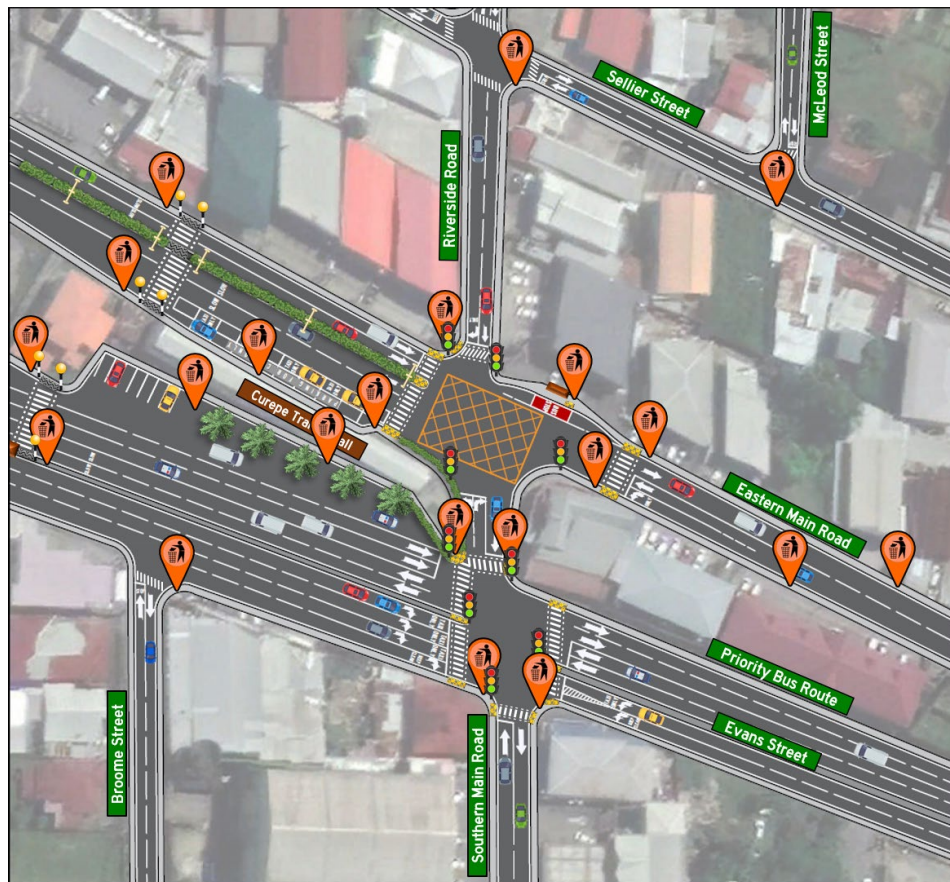


Figure 6.7: Sidewalk design: Trash receptacle sites

6.4 Crosswalk Design

Crosswalks at all signalised intersections were outfitted with ADA compliant furnishings, such as warning pads and Accessible Pedestrian Signals. The APS phasing would be automatic, eliminating the need for pushbuttons.

5

This crosswalk layout encourages movement near the traffic lights by restricting ADA compliant crosswalks to the signalised intersections. This design decision ensures all safety measures are catered for by limiting the elderly and disabled movements only to occur when vehicles are stationary.

6

Additional crosswalk along the EMR, 70m from the intersection, to distribute the foot traffic at the junction and restrict jaywalking. Since this inclusion is away from the signalised junction, pedestrians may cross the EMR when there is a gap in traffic. This crosswalk incorporates a stagger or “z” design with a pedestrian refuge zone between lanes. This design application forces pedestrians to assess oncoming traffic before progressing through to the second phase of the crossing.

Sufficient signage and safety measures must be installed at these crosswalks.

7

Additional crosswalk 110m from the junction, along the PBR, to facilitate convenient access and egress to and from the westbound bus shelter.

8

Referencing the current signal phases, both facilitates vehicular movements along the EMR. The inclusion of an exclusive pedestrian phase will allow safe and protected pedestrian movements across the EMR. This supplementary phase can be implemented after phase 1, deferred only the EMR movements of phase 2, creating a third phase, represented in Figure 6.8. Delaying phase 1 was not a recommended option because this would affect the northbound SMR traffic, creating an all-red vehicular phase across all the signals, which is not ideal for such a busy intersection. The recommended pedestrian time to facilitate this exclusive pedestrian phase is 15 seconds.

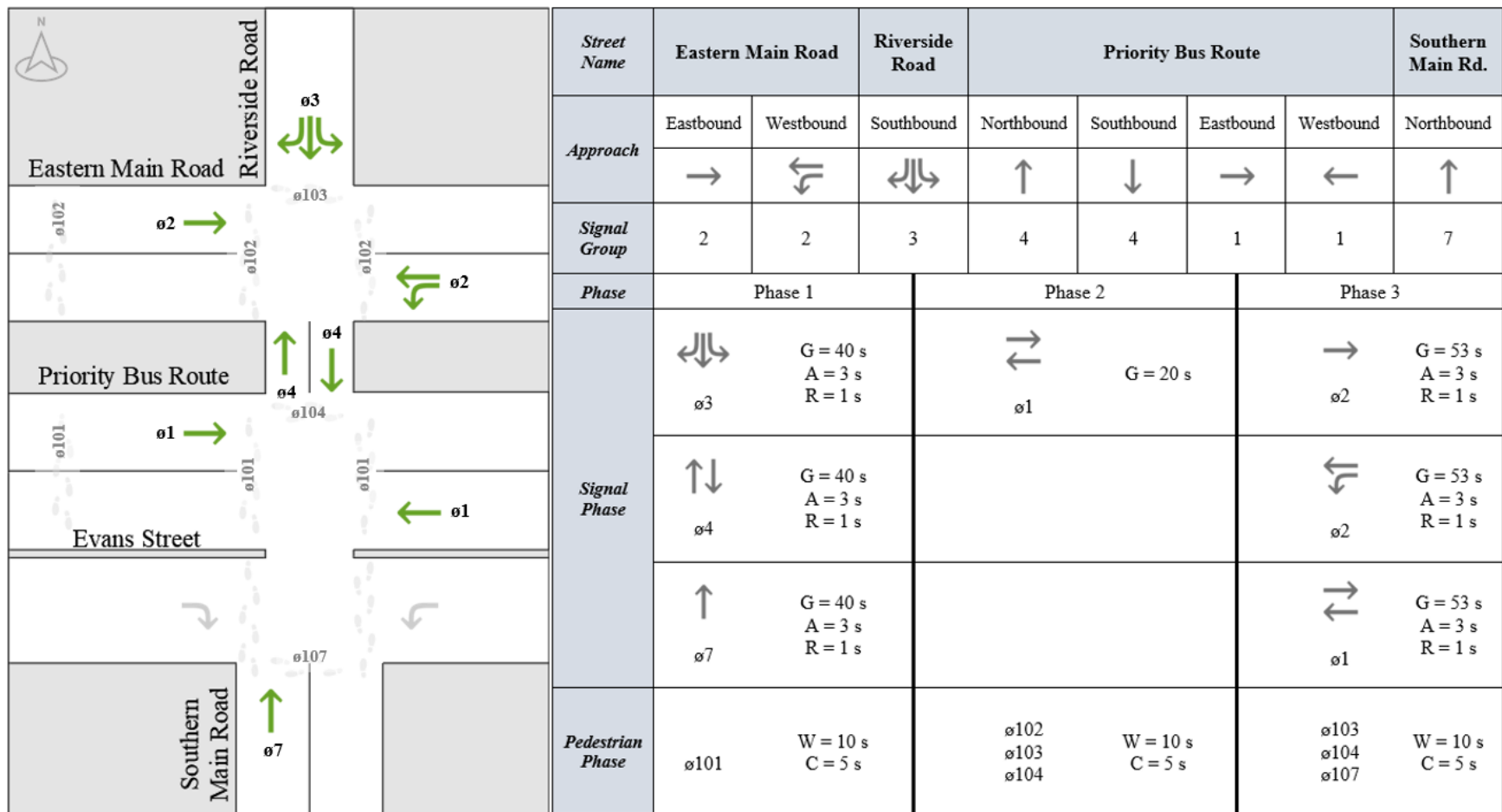


Figure 6.8: Crosswalk design: Revised phases

6.5 Bus Turnout

A bus turnout was incorporated in front of the commercial lot no. 19 on the far-side of the EMR junction. This location was selected due to the availability of space and the frequency of maxi-taxi stops at this location. The redesign overlays the bus lane partially on lot 19's storefront parking.

- 9 From evaluating the site, cars exiting lot 19 often face difficulties merging back onto the EMR, conflicting with ongoing traffic and creating confusion and delays within the box intersection. Additional parking for lot 19 is available on the western side of the building, along Riverside Road. Thus, with the addition of the proposed bus bay, free traffic flow along the EMR would be achieved.

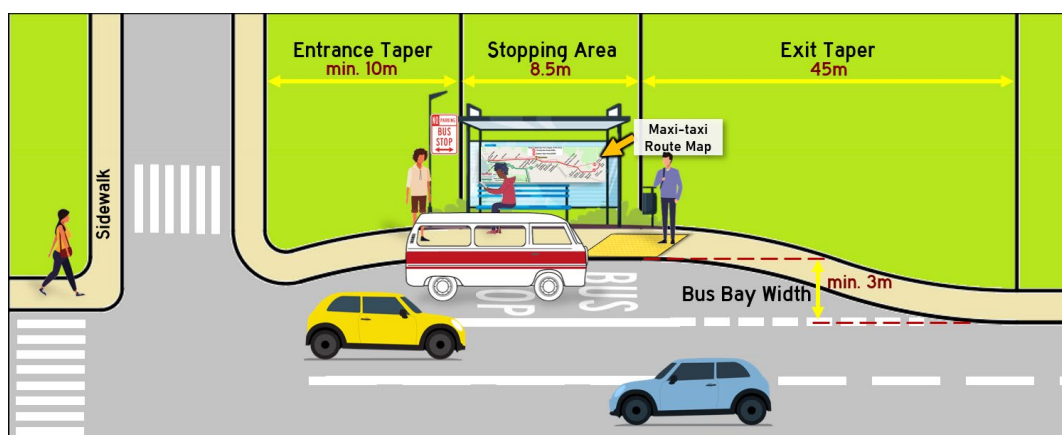


Figure 6.9: Bus turnout

6.6 Parking Zones

- 10 Designated parking accommodations on the southern side of the CTM for the mall tenants.
- 11 Designated parking accommodations on the northern side of the CTM for both the mall tenants and visitors/ customers.
- 12 Undeveloped/ abandoned lots of land with the potential to provide car park facilities for the hub.

CHAPTER 7

CUREPE DESIGN GUIDELINES VERIFICATION

7.1 Curepe Score Toolkit

The evaluation criteria developed below adapt the concepts within the Complete Streets Guide by Calgary Transportation Department (2014) and Parker (2019). The toolkit for assessing the “completeness” of the current and proposed design of Curepe, presented in Table 13, was developed using the following:

1. Design elements/ factors from the CDG following the format of the three core TEUD elements discussed in Section 4.1.
2. Design element rank, determined by the hub users and analysed by applying the Pairwise Matrix approach.
3. The hub users' current and proposed design score via the Likert scales were applied throughout this research.

The Pairwise Matrix compares individual factors against each other. The most important element receives a score of one (1) and the other receives a zero (0) in its respective row. The score, determined by the hub users, was placed in the “grey” shaded rows in Table 11. The remaining responses were inferred to avoid repeated questions to the busy hub users; thus, completing the matrix.

For example: If hub users perceive factor C as more important than factor F, the rank = 1; thus, the subsequent column asks if factor F is more important than factor C, which would be “no” based on the above. Therefore rank = 0, as illustrated in Table 10. Thus, the higher the total, the superior the factor.

Table 10: Matrix example

Factors	C	F	Dummy	Total
<i>C</i>	x	1	1	2
<i>F</i>	0	x	1	1

Including a dummy column ensures at least one point is given to each factor. These ranks are then applied to the Curepe score tool. Equally distribute ranks values for design elements with multiple sub-elements, such as the furnishings and network.

The factors for evaluating the design are:

- Community Pride = C
- The Furnishings = F
- The Network = N
- Maintenance = M

Table 11: Ranking the factors

Factors	C	F	N	M	Dummy	Total
<i>C</i>	x	1	1	1	1	4
<i>F</i>	0	x	1	1	1	3
<i>N</i>	0	0	x	0	1	1
<i>M</i>	0	0	1	x	1	2

The evaluation toolkit totals 50 points, and the points scheme are detailed below.

Table 12: Curepe score point system

Evaluation Score	Description
40 - 50	Hub user's ideal vision of the hub. The TEUD core elements are working for the end-users.
30 - 39	The hub meets the minimum threshold to satisfy the complete street concept.
20 – 29	There are problematic elements experienced throughout the hub that needs addressing.
0 - 19	The hub is not functioning for its end users and needs immediate attention.

7.2 Evaluation SSI

The final semi-structured interviews conclude the assessment of the design guidelines. The questions can be found in Appendix B, where the hub users were asked to assess the importance of the design elements using a pairwise matrix, results posted in Table 11. Community pride was deemed the most important element. The consensus was that without the respect and satisfaction of the people of Curepe, all the other elements would not function as intended.

The responses parallel previous research, where the principal consideration for any design must be the people/ the community. The design should then include features that enhance their experience within the space, i.e. the furnishings, and ensure the sustainability of such features, i.e., maintenance. Regarding the network, hub users stated that once improvements can be made to the already established network, the Curepe network can optimally function with the space; thus, this was deemed the least important of the four elements. The problems experienced with the network, addressed in Chapter 4, were the unreliable PTSC buses and the delays along the travelled path due to jaywalking and maxi-taxis.

The hub users were then asked to score the current design elements. They were then introduced to the CDG and were asked to re-score the design elements based on the proposed design. The responses, presented in Table 13 and Figure 7.1 were almost unanimous, with the main disagreement being the current sense of community experienced at Curepe.

The sense of community was deemed to be highly subjective. Before scoring this element, hub users mentioned their safety concerns and neighbourly attributes throughout Curepe. As anticipated, the street vendors predominantly ranked the current community element as three or higher, whereas the travellers predominantly ranked this element as two and below. Responses from business employees were inconsistent depending on their proximity to the central part of the hub and how often they interact with the space.

After presenting the proposed design, all the responses shifted to three and above. The hub users explained that by developing the committees, they are presented with opportunities to forge bonds with their fellow hub users to transform Curepe into a safer environment for everyone.

Overall, as shown in Table 13, the current Curepe design scored 20 out of 50, and the proposed design scored total. The current Curepe design score matches the initial interpretation of the space, where there are problematic elements experienced throughout the hub. The consensus for the proposed design was that the CDG presented covered all the issues they have experienced over the years.

For the final question of the SSI, the hub users reiterated their desire for the following:

- More police presence needed at the junction by either reintroducing the mobile police post or establishing a permanent unit. Hub users suggest developing the vacant space at the corner of the CTM to accommodate a glass office with intermittent police patrol, illustrated in **Figure 7.2**.
- The unused units within the CTM can operate as a community centre that hosts workshops, mentorship programs and life skills training for at-risk youths.
- Engage the organisations such as the Social Displacement Unit to assist the street dwellers of Curepe.

Table 13: Curepe score toolkit

Design Element		Rank ①	Current Design		Proposed Design	
			Score* ②	Element Score ① x ②	Score* ③	Element Score ① x ③
Community Pride		4	3	12.0	5	20.0
<i>Total Community Score:</i>		-	-	12.0	-	20.0
The Furnishings		3	-	-	-	-
	Traffic and Information Signage	0.5	3	1.5	5	2.5
	Inclusive Accessibility	0.5	1	0.5	5	2.5
	Shelter/ Shading Elements	0.5	2	1.0	5	2.5
	Greenscape Design	0.5	1	0.5	5	2.5
	Celebrating Character	0.5	1	0.5	5	2.5
	Sanitation Accommodations	0.5	1	0.5	5	2.5
<i>Total Furnishings Score:</i>		-	-	4.5	-	15.0
The Network		1	-	-	-	-
	The Sidewalk	0.2	1	0.2	5	1.0
	The Crosswalk	0.2	1	0.2	5	1.0
	Bus Stop Accommodations	0.2	1	0.2	5	1.0
	Road Markings	0.2	3	0.6	5	1.0
	Parking Accommodations	0.2	1	0.2	5	1.0
<i>Total Network Score:</i>		-	-	1.4	-	5.0
Maintenance		2	1	2.0	5	10.0
<i>Total Maintenance Score:</i>		-	-	2.0	-	10.0
TOTAL SCORE:		-	-	20.0	-	50.0

*Score column, grey cells, using the Likert Scale Rating where 1 = Very Poor; 2 = Poor; 3 = Acceptable; 4 = Good and 5 = Excellent.

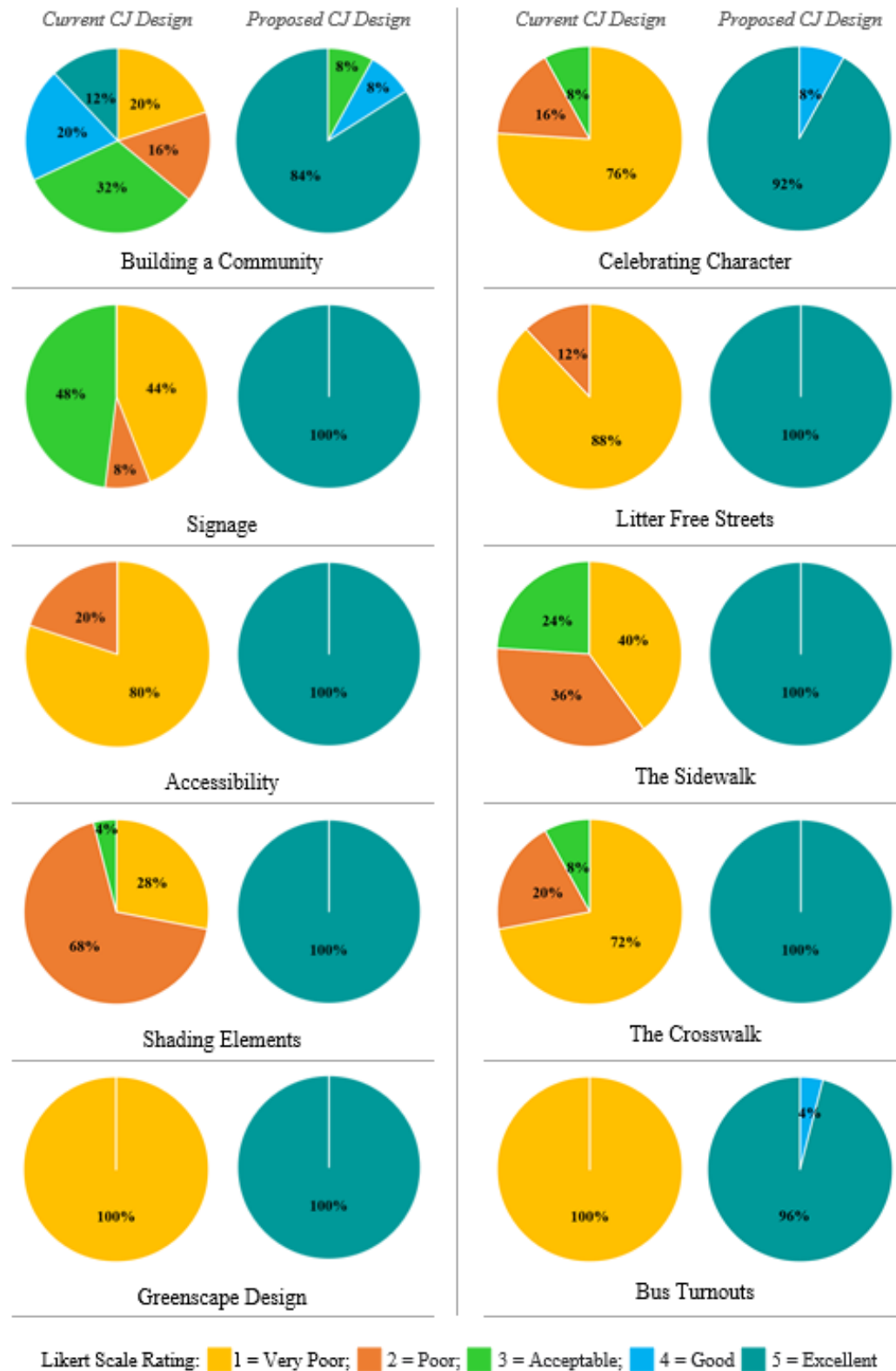


Figure 7.1: SSI CDG Score for the current vs proposed CJ design

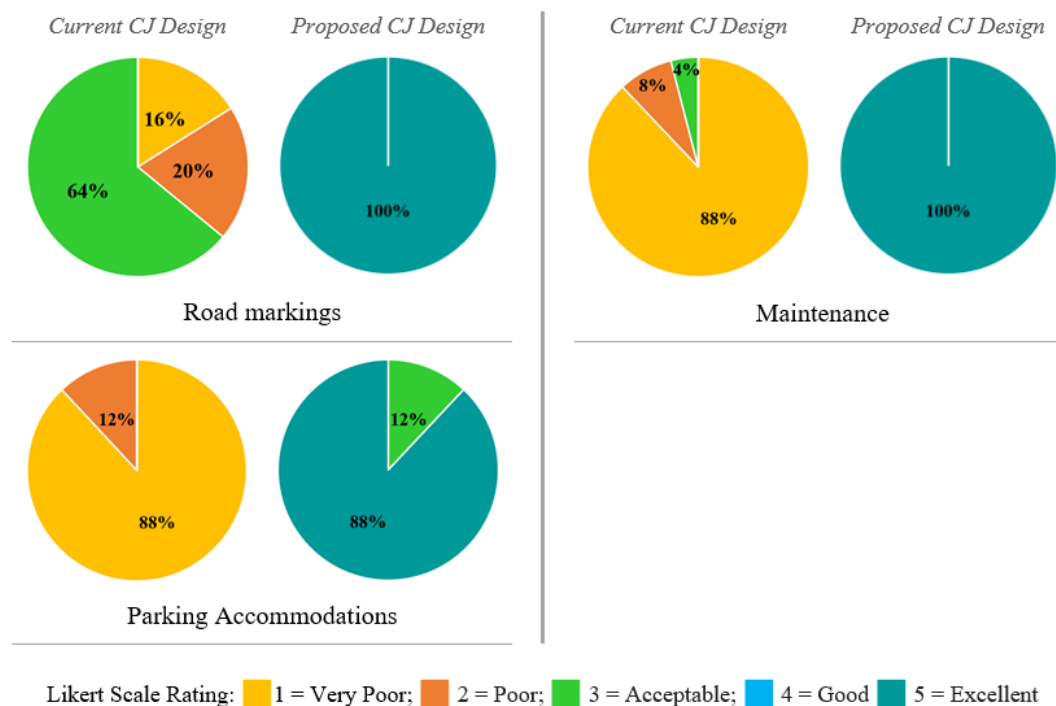


Figure 7.1 (continued)

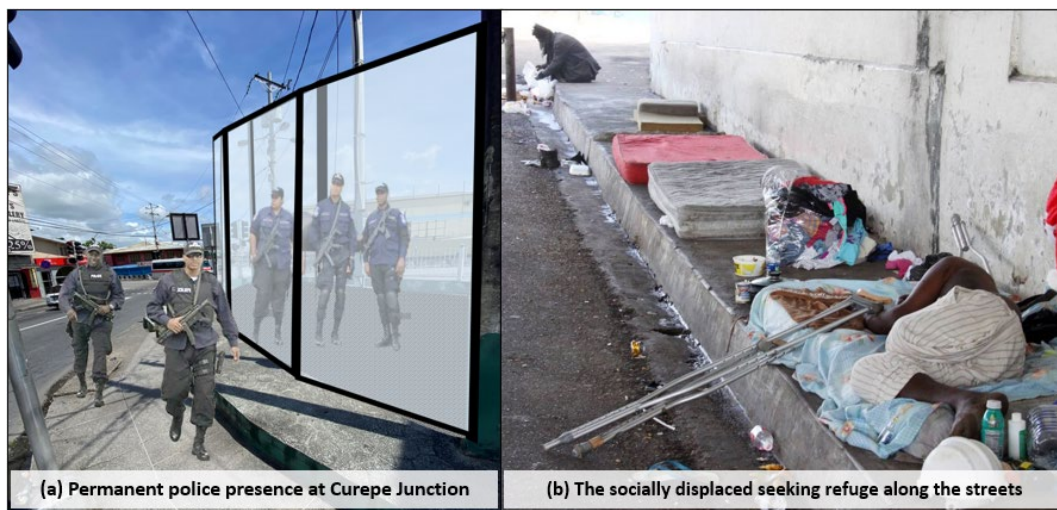


Figure 7.2: Hub users main concern with Curepe Junction

Source: Image (a) Government of the Republic of Trinidad and Tobago (2014a, 2014b); Image (b) Dhalai (2018)

CHAPTER 8

CONCLUSION

8.1 Conclusion

The research aim was to develop and assess the potential impacts of design guidelines for the problematic TEUD elements within Curepe Junction. This paper achieved this by exploring the junction through the lens of the hub user. This concept was designed to create a paradigm shift for addressing dysfunctional hubs in Trinidad and Tobago. The conventional approach uses trained engineers to assess a hub; this dissertation introduced the user factor as a resourceful solution. This technique addressed the objectives of this research, i.e. identifying the problematic TEUD elements of Curepe Junction, developing the design guidelines and assessing the potential impacts.

The literature revealed that successful spaces have three core elements stemming from the multifaceted TEUD disciplines: The People, The Furnishings and The Network. Translating these core elements in the context of Curepe Junction, 17 main elements were identified and assessed by 100 hub users. The findings indicated that by prioritising the perception of the hub users, the research accounted for years' worth of experiences, noting that all three core elements of the hub were severely neglected and disconnected.

Upon interviewing the hub users on their experience with these elements, they ranked 59% of the 17 elements as acceptable, 6% as poor and 35% as very poor. Below identifies the main problematic elements and answers the research question:

- 64% of the interviewees ranked the accessibility for the elderly and people with disabilities as very poor.
- 62% of the interviewees ranked the accessibility and presence of transportation services information as very poor.

- 61% of the interviewees ranked the accessibility to comfortable and convenient seating as very poor.

The multidisciplinary nature of the problematic elements demanded more than the traditional transportation engineering and urban design manuals. Thus, concepts such as the Complete Streets, Context Sensitive Solution and Portals to Places were explored, noting no literature was outfitted for local use.

After analysing the problematic elements, the second objective was completed by developing The Curepe Design Guidelines. These guidelines were developed to shift the design precedent from an outdated automobile-centric junction to one where hub users of all ages and backgrounds feel comfortable. Furthermore, the CDG ensured that each step was designed with the user in mind, from building a community that celebrates the sui generis character of Curepe, to ensure each part of the hub is easily accessible with comfort and image in mind.

The final objective was achieved by comparing the current design with the redesign. Based on the final interviews, the toolkit further validated the importance of the hub users' involvement, with 70% of the elements scoring "excellent" and the overall maximum points achieved for the redesign.

The interviewees initially perceived Curepe as a very social hub, so it was no surprise that the most critical design element identified was the sense of community. By designing a space that promotes community pride, Curepe Junction has the potential to become a "third place" that encourages socialisation and pride, transforming Curepe Junction into a thriving community, boosting businesses and character. Initially, 60% of the users associate the hub with negative connotations, describing the space as unsafe, lawless, dirty and chaotic. However, when presenting the redesign, the hub users were eager to interact with the hub and visit more often for reasons other than travel. Furthermore, by improving the furnishings and network of Curepe, the design satisfies the innate way-finding behaviour of the people of Curepe Junction, creating a space hub users can comfortably enjoy and explore on their own. The potential impact of implementing the guidelines is advocating for an inclusive environment, satisfying all the hub users regardless of their age, gender, disability, and role in Curepe.

Even though only 60% of the hub users felt that it was important to have a say in the design, each hub user expressed their experience with Curepe Junction, whether good or bad. Overall, all the interviewees expressed their desire to have a better functioning hub, which consequently attributed to the success of the Curepe Design Guidelines.

In conclusion, the intention for developing the CDG was to inspire stakeholders, policymakers and designers to develop areas in Trinidad and Tobago based on user perception. Even though this paper is specific for Curepe Junction and its community, the adoptability and practical significance of this research are attributed to the modular technique developed and utilised throughout. Therefore, the CDG can be universally applied to similar hubs throughout Trinidad and Tobago, including Croisee and City Gate.

8.2 Opportunities for Further Research

The list below offers opportunities and recommendations to further the concepts and ideas presented throughout this research project:

1. Develop and establish Common/ Public Space Policies for Curepe Junction. Vending on the streets of Curepe may be inevitable; however, by developing such public space implementation strategies, policymakers can manage the chaotic streetscape of Curepe Junction and find common ground with the street vendors of the area.
2. The proposed inclusion of the bus turnout creates an opportunity to use traffic simulation programs such as Aimsun. In addition, future research can assess the impact of the bus bay on the level of service at the junction.
3. Introduce tactical urbanism before executing costly redesigns. This social experiment technique is an inexpensive means of assessing temporary changes to the built environment. This concept revitalises a portion of the streetscape to create a dialogue between the hub users

and the urban and transportation planners. Examples of this concept are the “Mierīgi!” Blue Street Project by Fine Young Urbanists (2014) and the “Fun Theory” initiated by Volkswagen to influence positive human behaviour by making mundane activities fun, such as throwing trash in a bin or crossing at a designated crosswalk (PBJ Designs 2016). Such creative approaches allow decision-makers to sanction design changes confidently.

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APPENDICES

APPENDIX A: DATA COLLECTION



Figure A.1: Curepe Junction road markings and pictorial view sections

Source: Adapted from Google Earth (2021)

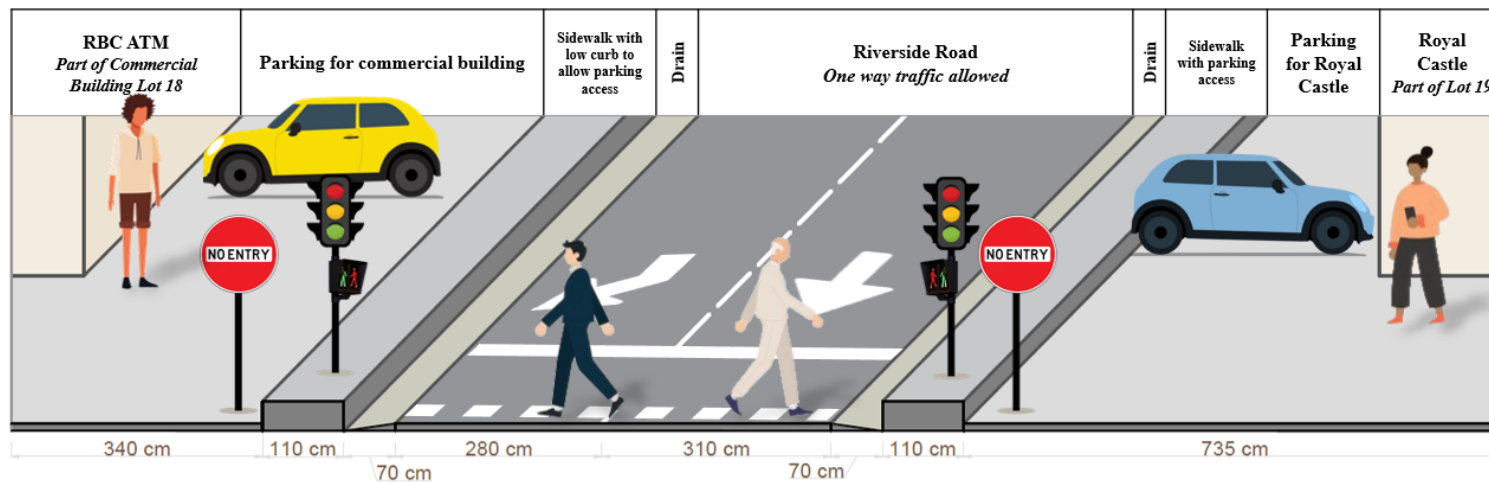


Figure A.2: Pictorial view section A-B: Riverside Road

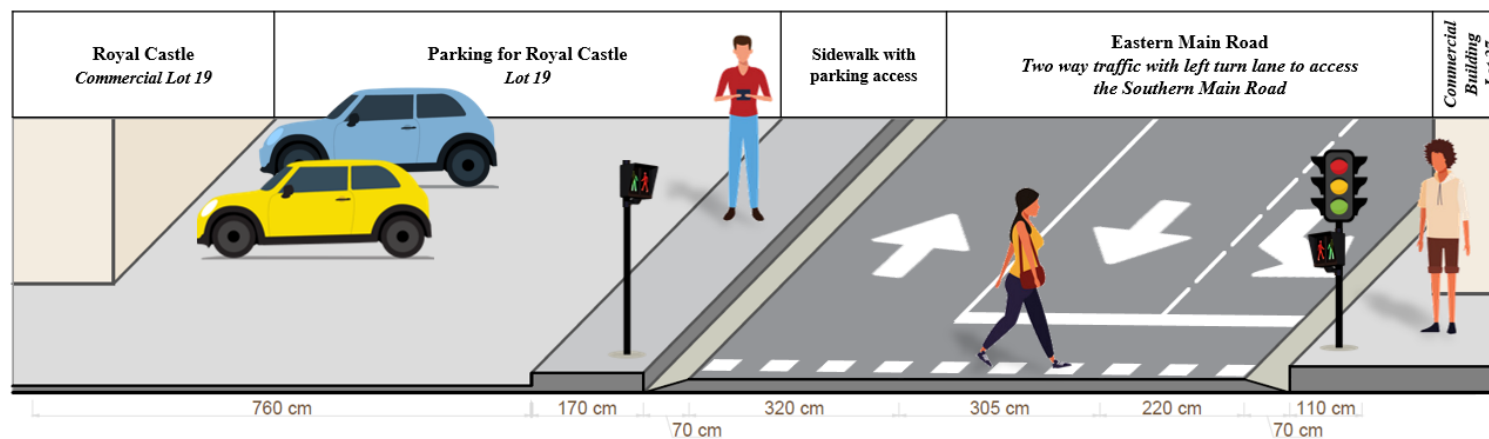


Figure A.3: Pictorial view section B-C: Eastern Main Road

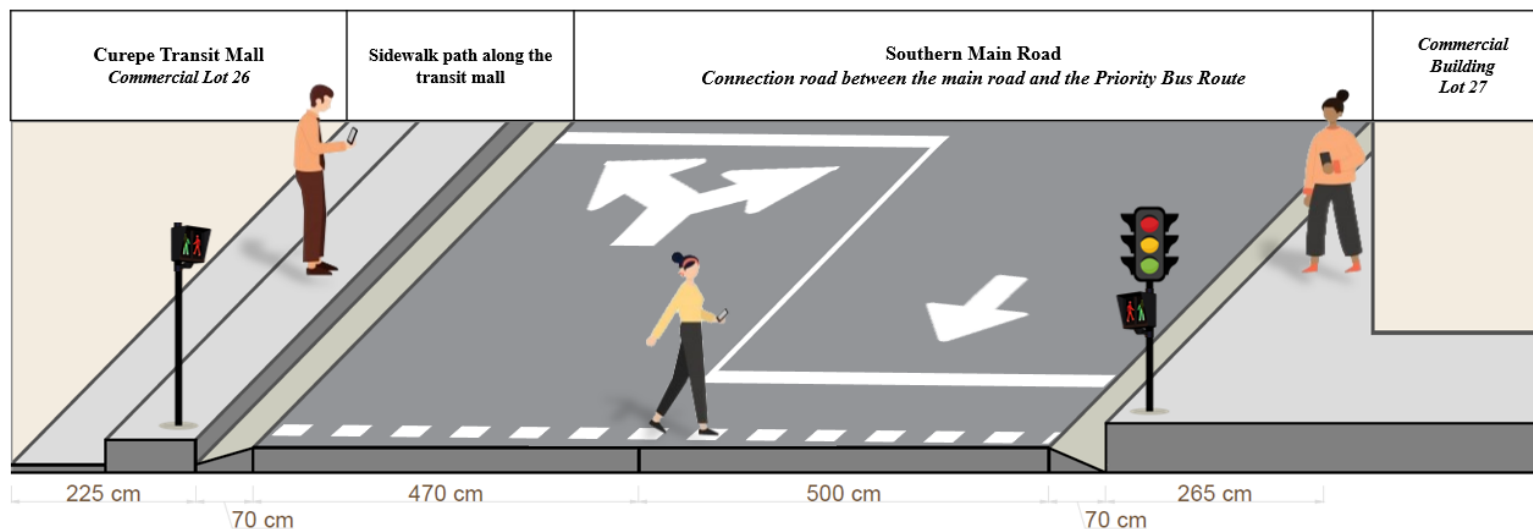


Figure A.4: Pictorial view section C-F: SMR intersection road

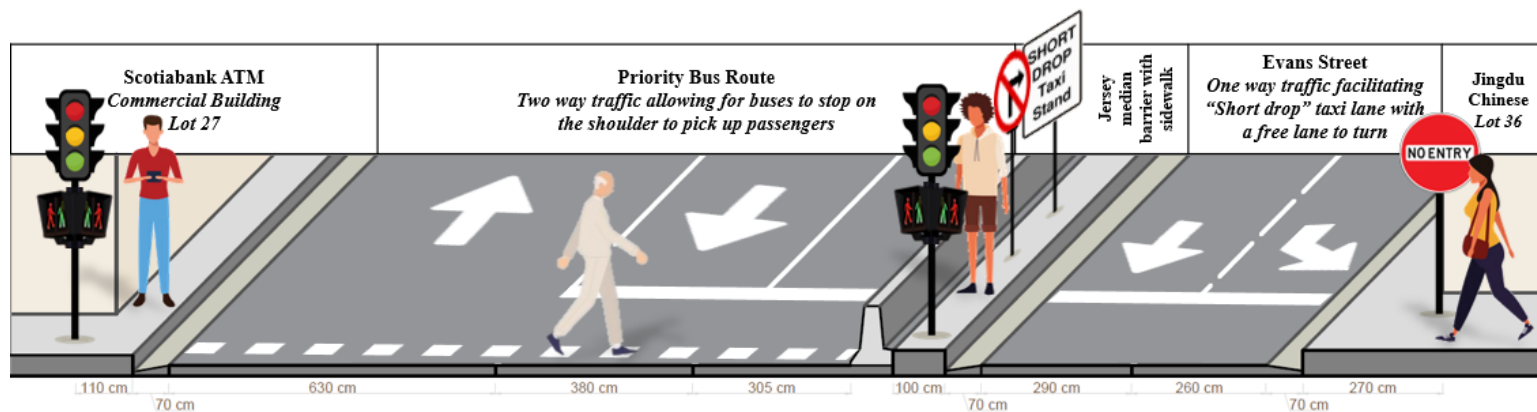


Figure A.5: Pictorial view section C-D: PBR and Evans Street

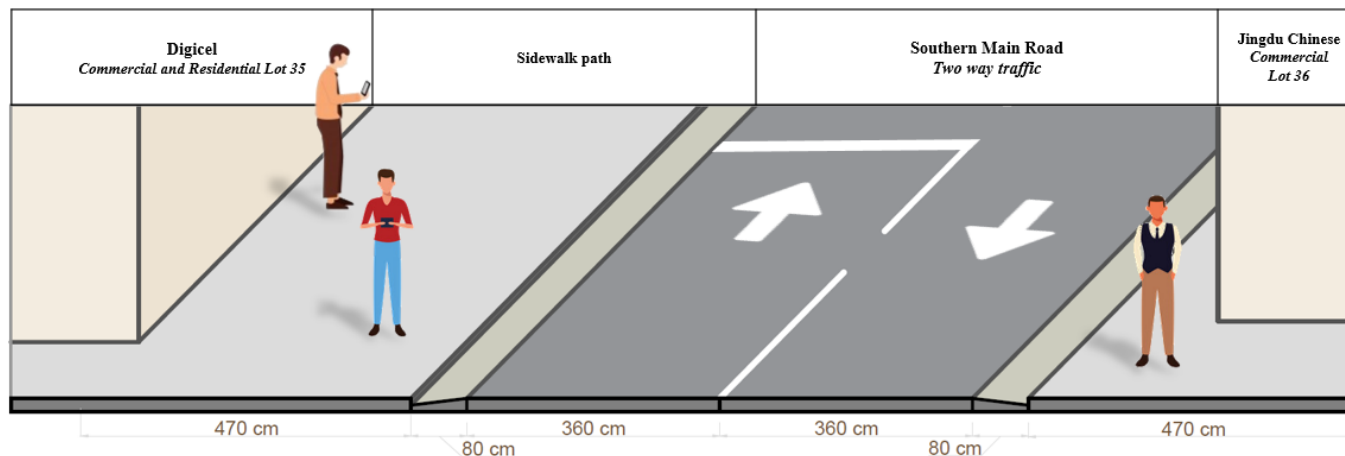


Figure A.6: Pictorial view section D-E: Southern Main Road

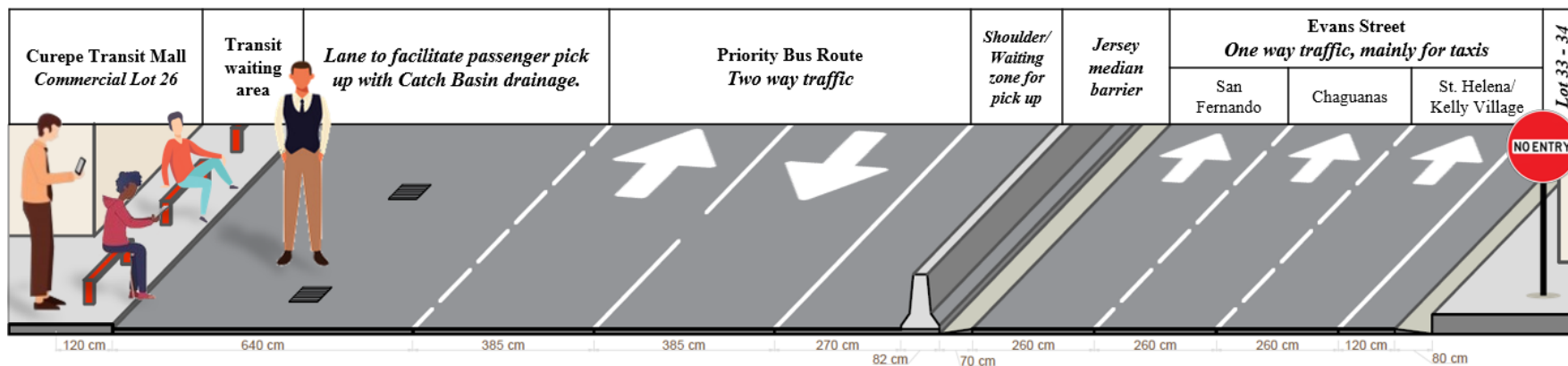


Figure A.7: Pictorial view section E-F Priority Bus Route and Evans Street

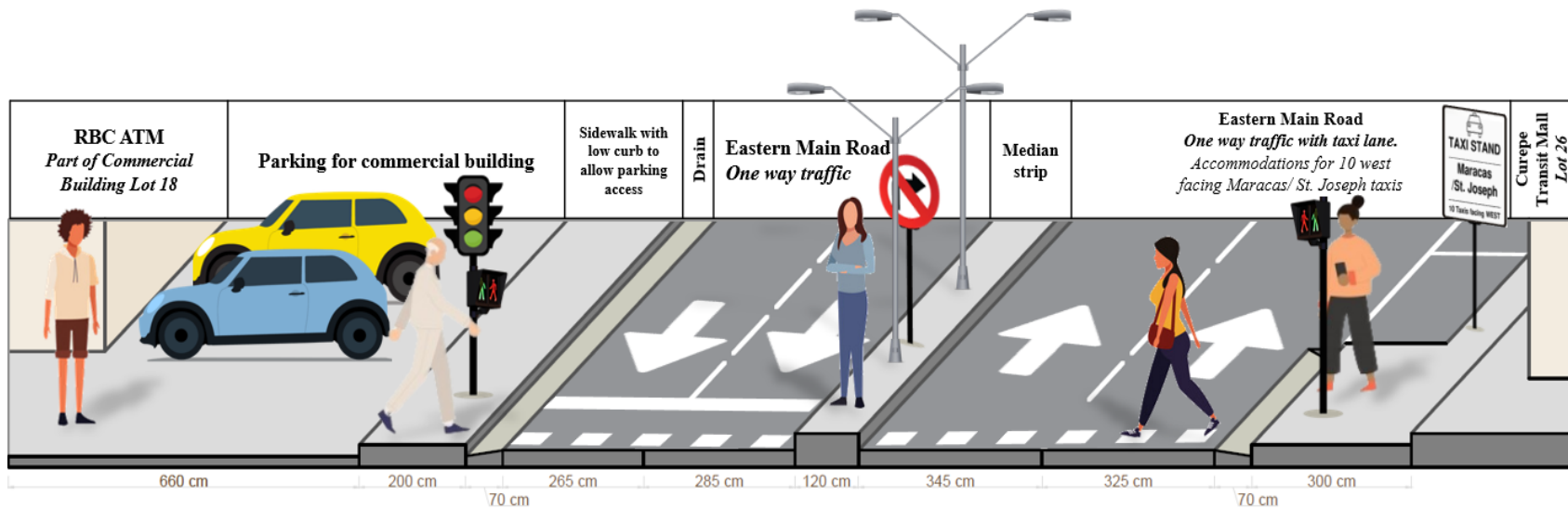


Figure A.8: Pictorial view section A-F Eastern Main Road

Table A.1: Lot listing of Curepe Junction

Lot No.	Name of Business	Type of Business/ Services	Land Use	Category
1	Residential	Residential	Residential	Residential
2	Panoptic Niche Perfumery & Boutique	Clothes	Commercial	Clothes
2	Residential	Residential	Residential	Residential
3	Residential	Residential	Residential	Residential
5	Farida's Roti Shop	Food	Commercial	Food
5	Residential	Residential	Residential	Residential
6	Roxanne's Bar and Suya Spot	Bar	Commercial	Bar
6	Defined Hair and Nails	Beauty – Hair and nails	Commercial	Beauty
6	Breakfast and Lunch Express	Food	Commercial	Food
7	Residential	Residential	Residential	Residential
8	Zulaka and Sons Poultry Depot & Mini Mart	Grocery	Commercial	Grocery
9	Residential	Residential	Residential	Residential
10	Curepe Medical Lab	Healthcare	Commercial	Healthcare
10	Pentecostal Church	Church	Institutional	Church
10	UWI Eastern Caribbean Health Outcomes Research Network	Education/ Research	Institutional	Education
12	Residential	Residential	Residential	Residential
13	Nicole's Delights	Food	Commercial	Food
13	Residential	Residential	Residential	Residential
14	Residential	Residential - Apartments	Residential	Residential
15	Street Vendor	clothes and shoes	Commercial	Clothes
15	Fresh Choice Fruit and Vegetable Mart	Grocery	Commercial	Grocery
15	Curepe One Stop Shop	convenience store	Commercial	Home Store
15	Highest High Definition	photocopy and net café	Commercial	Print
16	St. Mary's Bakery	Food - Bakery	Commercial	Food
16	Dr. Cy Anil Warren – Physician and Surgeon	Healthcare - Doctor's Office	Commercial	Healthcare
17	Sherry's Hairdresser	Beauty - Hair	Commercial	Beauty
17	Made 2 Love	Beauty - Nail	Commercial	Beauty
17	Amin's Roti Shop	Food	Commercial	Food
17	Infinity Dental Care	Healthcare - Dental	Commercial	Healthcare
17	Dr. Wahid Mohammed – Family Practitioner	Healthcare - Doctor's Office	Commercial	Healthcare
17	ISA Technology	Print and copy	Commercial	Print
17	Tai Chi Classes	Extra-Curricular	Institutional	Recreational
18	ATM - RBC	Banking Facility	Commercial	Banking Facility
18	Caribbean Trim	Beauty – Hair/ Barber	Commercial	Beauty
18	NLCB Lottery Centre	Gambling/ Lottery	Commercial	Gambling
18	J.A. & M Supermarket	Grocery	Commercial	Grocery
18	Codecc Pharmacy Limited	Pharmacy	Commercial	Healthcare
18	Church - Pentecostal	Church	Institutional	Church
18	Hair World	Beauty - Hair	Commercial	Beauty

Table A.1 (continued)

Lot No.	Name of Business	Type of Business/ Services	Land Use	Category
19	ATM – Republic Bank	Banking Facility	Commercial	Banking Facility
19	Club Bounce	Bar & Club	Commercial	Bar
19	Royal Castle	Food	Commercial	Food
19	Street Vendor	Produce	Commercial	Produce
20	KFC	Food	Commercial	Food
21	Mima's Beauty Longue	Beauty - Hair and Wax	Commercial	Beauty
21	Subway	Food	Commercial	Food
21	Prestige Convent Care	Education - Day care & Preschool	Institutional	Education
21	St. Joseph Academy	Education - Improvement Classes	Institutional	Education
23	Sommer In Style's	Beauty - Spa and Beauty Salon	Commercial	Beauty
23	Chidoz Marketing	Clothes and electronics	Commercial	Clothes
23	Sons of Fire Ministries	Church	Institutional	Church
24	Orchestrated Hair	Beauty - Hair	Commercial	Beauty
24	Super Savers Supermarket	grocery	Commercial	Grocery
24	Residential	Residential	Residential	Residential
25	TTPOST	Government services	Commercial	Postal
26	Curepe Transit Mall - Sponge	Bar/ Juices	Commercial	Bar
26	Curepe Transit Mall - DVD & Nails	Beauty	Commercial	Beauty
26	Curepe Transit Mall – Barber	beauty	Commercial	Beauty
26	Curepe Transit Mall - Best Price	Clothes	Commercial	Clothes
26	Curepe Transit Mall - Food Connoisseur	Food	Commercial	Food
26	Curepe Transit Mall - Food Connoisseur	Food	Commercial	Food
26	Curepe Transit Mall – Mini Mart	grocery	Commercial	Grocery
26	Street Vendor	Vegetable Stall	Commercial	Produce
26	Curepe Transit Mall - Seamstress	Seamstress	Commercial	Seamstress
26	Curepe Transit Mall - Seamstress	Seamstress	Commercial	Seamstress
26	Curepe Transit Mall - Seamstress	Seamstress	Commercial	Seamstress
26	Curepe Transit Mall – Shoe Repair Shop	Shoe repair	Commercial	Shoe
26	Curepe Transit Mall – Artist Shop	Art	Institutional	Recreational
27	Scotiabank ATM	Banking Facility	Commercial	Banking Facility
27	Peter's Bar	Bar	Commercial	Bar
27	Selwyn & Son's Barber Shop	Beauty - Hair	Commercial	Beauty
27	Mandy's Fashion	Clothes	Commercial	Clothes
27	Eastern Avenue	Clothes	Commercial	Clothes
27	It's A Deal	DVD shop	Commercial	Electronic
27	Food Vendor (Ice Cream	Food	Commercial	Food
27	Jackpot	Gambling	Commercial	Gambling
27	S & J Mini Mart	Grocery/ fresh produce	Commercial	Grocery
27	Bobby's & Sons Jewellery	Jewellery	Commercial	Shopping
27 - 28	NLCB Lottery Centre	Gambling/ Lottery	Commercial	Gambling

Table A.1 (continued)

Lot No.	Name of Business	Type of Business/ Services	Land Use	Category
28	Papa John's	Food	Commercial	Food
28	Nova ICT (Information & Communication Tech)	Print & Gaming	Commercial	Print
29	Sky's Beauty Salon	Beauty - Hair and nails	Commercial	Beauty
29	Elysian Beauty Studio	Beauty - wax and nails	Commercial	Beauty
29	TT Connect	Government Services	Commercial	Government
29	Pinceps Branding	Printing company	Commercial	Print
29	Bmobile	Utilities	Commercial	Utilities
30	Grasshopper Bar	Bar	Commercial	Bar
30	B & M Exclusive	Clothes	Commercial	Clothes
30	Bimini	Food	Commercial	Food
30	R & Y BBQ & Jerk	Food	Commercial	Food
30	NLCB Lottery Centre	Gambling/ Lottery	Commercial	Gambling
31	Automotive Technology College (ATC)	Education – trade courses	Institutional	Education
33	Hello Chicken	Food	Commercial	Food
33	Lin's Food	Food	Commercial	Food
33	Street Vendor	Fruit and veg stall	Commercial	Produce
34 - 35	Trini Wok Delights	Food	Commercial	Food
35	Bibi's One Stop Fashions	Clothes	Commercial	Clothes
35	Digicel	Utilities	Commercial	Utilities
35	Street Vendor	Electronic Kiosk	Commercial	Electronic
35	Residential	Residential	Residential	Residential
36	Junction Bar	Bar & Gaming	Commercial	Bar
36	Nails and Hair by Afron	Beauty & Clothes	Commercial	Beauty
36	M Genterprises	Clothes	Commercial	Clothes
36	Jingdu Chinese Fast Food	Food	Commercial	Food
38	Wincent's Member's Club	Gambling	Commercial	Gambling
38	Courts	Furniture store	Commercial	Home Store
39	UNIPET	Gas Station	Commercial	Gas
39	U-store	Grocery & Bakery	Commercial	Grocery

APPENDIX B: SEMI-STRUCTURED INTERVIEWS

Appendix B.1: Stage 3: Hub user SSI questions

Date: _____ Time: am/pm _____ Sex: M/F Age: _____
 Occupation: _____ Address: _____

1. What comes to mind when you think of Curepe Junction such as your likes and dislikes?

2. What brings you to Curepe Junction today?

☐ Travel ☐ Work ☐ Errand
☐ Socialise ☐ Relax Other _____

3. Would you say Curepe Junction is pedestrian friendly? ☐ Yes ☐ No

4. Would you ride a bike through Curepe Junction? ☐ Yes ☐ No

5. Rate your experience through Curepe Junction from 1 to 5:

Element of Curepe	Rating					Rating ≤ 2, please state why? (Optional)
	1	2	3	4	5	
Ease of accessibility for elderly and differently abled						
Aesthetics of Curepe Junction						
Cleanliness of Curepe Junction						
Connectivity between Priority Mall and its surroundings						
Driving behaviour while you are crossing						
Ease of crossing the streets around Curepe Junction						
Frequency of transport services						
Accessibility of information for the public transit services						
Priority Mall Lighting						
Feeling of Safety						
Seating accommodations around the Priority Mall						
Shelter from sun and rain						
Sidewalk path, is there sufficient walking room?						
Signage and information visibility such as bus/ taxi signs						
Street Lighting around Curepe Junction						
Travelling experience to & from Curepe Junction						
Walking experience through Curepe						

Likert Scale Rating: 1 = Very Poor; 2 = Poor; 3 = Acceptable; 4 = Good and 5 = Excellent

6. What is a comfortable walking time for you to get to a desired location or run an errand?

☐ ≤ 5 minutes ☐ 5 – 10 minutes ☐ 10 – 15 minutes

7. What vendors/ amenities do you visit around Curepe Junction?

8. What vendors/ amenities would you like to visit if it were nearby?
-
9. Are you aware of all the businesses/ services the terminal mall has to offer? ☐ Yes ☐ No
10. When crossing the road, do you:
- ☐ Always use the crosswalk ☐ Use the crosswalk sometimes
- ☐ Always cross wherever and whenever there is a chance
11. Do you think a pedestrian overpass would an asset to Curepe Junction? ☐ Yes ☐ No
12. Do you consider yourself a way-finder (someone who does not need directions to find their way around- or a way-follower (someone who relies on directions)? ☐ Finder ☐ Follower
13. What mode of transport did you use to get here?
- ☐ Private Car ☐ Taxi/ PH ☐ Maxi
- ☐ PTSC Bus ☐ Walk/ Cycle Other _____
14. What mode of transport are you waiting on?
- ☐ Private Car ☐ Taxi/ PH ☐ Maxi
- ☐ PTSC Bus ☐ Walk/ Cycle Other _____
15. What is the average time you wait for your preferred transport services?
16. Would you say that public transportation is a daily life necessity? ☐ Yes ☐ No
17. How often do you travel?
- ☐ Everyday ☐ Few days per week ☐ Few days per month
18. Do you rely on public transportation services as your only form of transport? ☐ Yes ☐ No
- If no, why did you decide to travel today?
19. Would you be interested in a park and ride system? ☐ Yes ☐ No
20. Would you like to see greenery added to Curepe Junction? ☐ Yes ☐ No
- If yes, where would you like to see greenery added? _____
21. Are you aware of the history of Curepe Junction? ☐ Yes ☐ No
22. Does such historical information interest you? ☐ Yes ☐ No
23. How has the recent paint job to the Curepe Transit Mall change your mood while travelling through Curepe?
- ☐ I love it, it uplifts my travelling experience ☐ The aesthetics does not affect my travels

24. Would you like to see more visual upgrades around Curepe Junction? ☐ Yes ☐ No

If yes, where would you like to see upgraded?

25. Do you agree to introduce design features to deter the homeless and undesirable behaviour, such as vandalism to Curepe Junction? ☐ Agree ☐ Disagree

If disagree, why? _____

26. Would you visit Curepe during your free time? ☐ Yes ☐ No

27. Have you ever been surveyed for Curepe Junction? ☐ Yes ☐ No

28. If you have suggestions to improve Curepe, do you know where to submit them or who you need to speak to? ☐ Yes ☐ No

29. Have you ever formally submitted any suggestions to the relevant authority? ☐ Yes ☐ No

If yes, what was the outcome of your submission?

30. Would you like to have a say in future development in Curepe Junction? ☐ Yes ☐ No

31. How would you like to be involved and informed?

☐ Community Meetings ☐ Online Surveys ☐ Post

32. During which aspect/s of the development would you like to be involved in?

☐ Initiation Stage ☐ Planning & Design Stage ☐ Both

33. Why is it important for you to have an input in the development of Curepe Junction?

34. Do you have any other improvements/ recommendations or even your vision to of Curepe Junction that you would like to add that was not covered in this survey?

Appendix B.2: Stage 7: Hub user SSI questions

Date: _____ Time: am/pm Sex: M/F Age: _____
 Occupation: _____ Address: _____

1. Determine the importance of the following elements:

- i. Would you say having a sense of community pride is more important than improving the furnishings of Curepe? ☐ Yes ☐ No
- ii. Would you say having a sense of community pride is more important than developing the network of Curepe? ☐ Yes ☐ No
- iii. Would you say having a sense of community pride is more important than the maintenance of Curepe? ☐ Yes ☐ No
- iv. Would you say improving the furnishings is more important than the developing network of Curepe? ☐ Yes ☐ No
- v. Would you say improving the furnishings is more important than the maintenance of Curepe? ☐ Yes ☐ No
- vi. Would you say the developing the network is more important than the maintenance of Curepe? ☐ Yes ☐ No

2. Score the following design elements of Curepe from 1 to 5.

Likert Scale Rating: 1 = Very Poor; 2 = Poor; 3 = Acceptable; 4 = Good and 5 = Excellent

Design Element		Current Score	Proposed Score*
Community Pride			
The Furnishings		-	-
	Traffic and Information Signage		
	Inclusive Accessibility		
	Shelter/ Shading Elements		
	Greenscape Design		
	Celebrating Character		
	Sanitation Accommodations		
The Network		-	-
	The Sidewalk		
	The Crosswalk		
	Bus Stop Accommodations		
	Road Markings		
	Parking Accommodations		
Maintenance			

* Present the CDG and application.

3. What would you like to add or change about the proposed design?

APPENDIX C: DESIGN GUIDELINES

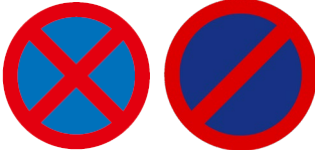
	Traffic Sign	Location/ Use
Danger Warning		“Pedestrian Crossing” sign at all crosswalks. Positioned a minimum of 45m from the crosswalk.
		“Disabled Access Crossing” sign at crosswalks with ADA compliant furnishings, i.e. near the CTM Positioned a minimum of 45m from the crosswalk.
		Located at crosswalks below D-1 or D-2 that are not at an intersection.
Regulatory Signs		“Maximum Speed Limit” sign near popular turn off locations, such as Curepe Junction, and along the roadway. Positioned 5km apart.
		“Maximum Speed Limit” sign near popular turn off locations, such as Curepe Junction, and along the roadway. Positioned 8 - 10km apart.
		“Direction to be followed” sign located near the restricted intersection where only straight ahead movement is permitted. Positioned within 10m from the intersection.
		“No Entry” sign located near the restricted intersection. Positioned a minimum of 50m from the intersection.
		“No Stopping” sign along the main roads and PBR. “No Parking” sign along the main roads.

Figure C.1: Traffic signs and locations for Curepe

Source: Adaptations from The Licensing Authority (2013) and Republic of Trinidad and Tobago. MOWI (2013)

	 	Located at taxi zones and the proposed bus bay
	 	“Box Junction” warning sign placed just before entering Curepe Junction. Suggested penalty fees added to ensure drivers do not enter the box junction unless their exit is clear.
	 	“No Parking” signs placed near the CTM to facilitate the tenants and customers/ visitors of the mall.
	 	Taxi signs to guide taxi zones

Figure C.1 (continued)

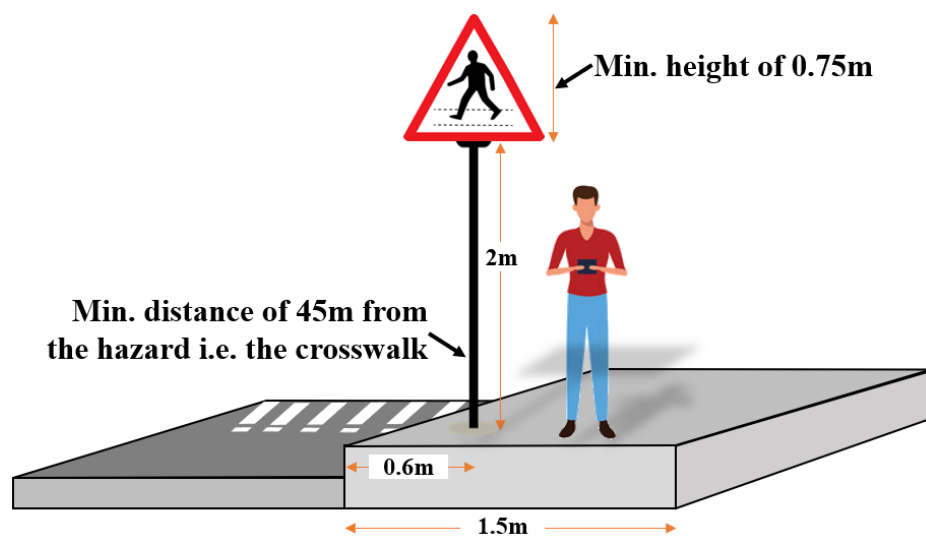


Figure C.1: Recommended traffic sign dimensions

Globe Bulb:

- Diameter = 275 mm
- Illuminated by a flashing light.

Globe Post:

- Post Height = 2.5m
- Coloured black and white in alternate horizontal bands that are clearly visible to approaching traffic.
- Each band width = 300mm

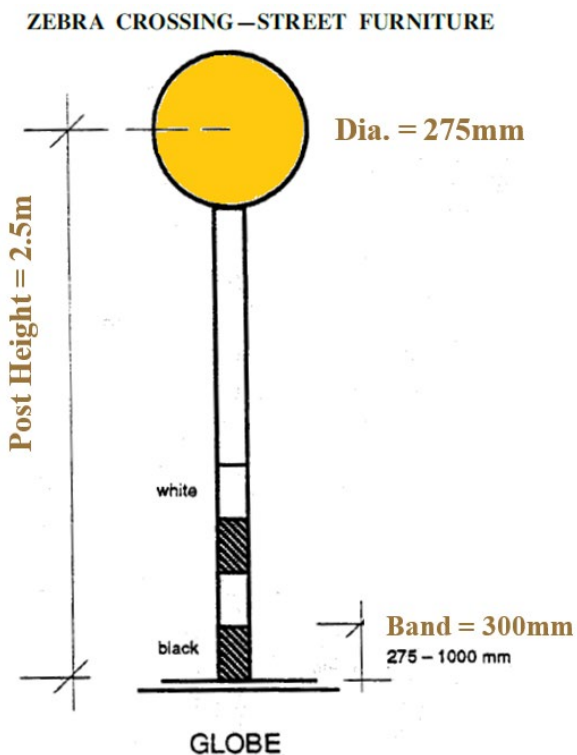
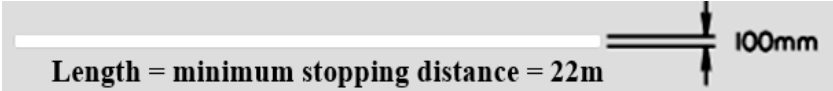
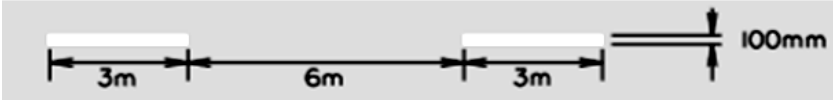
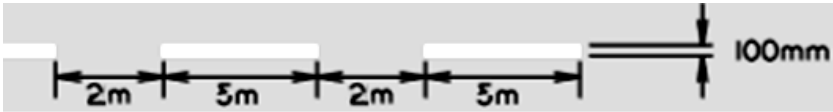
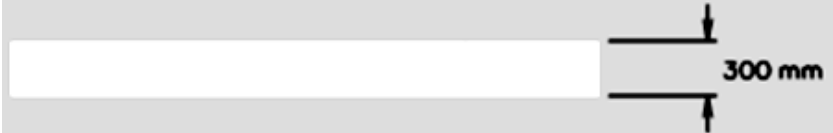
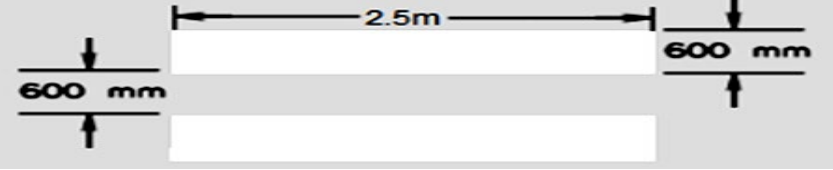
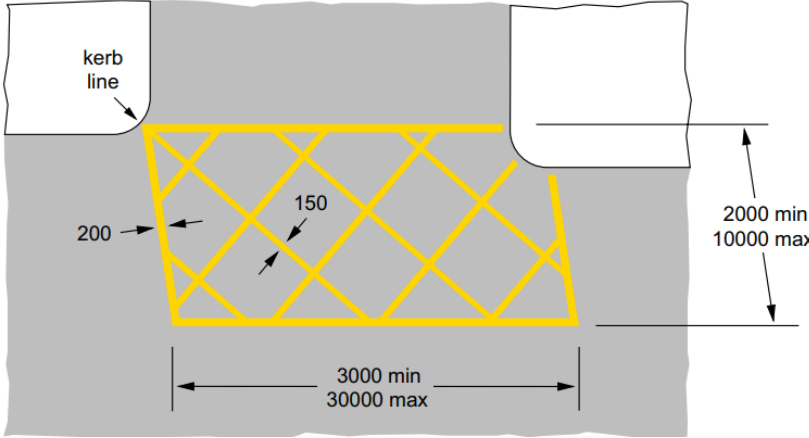
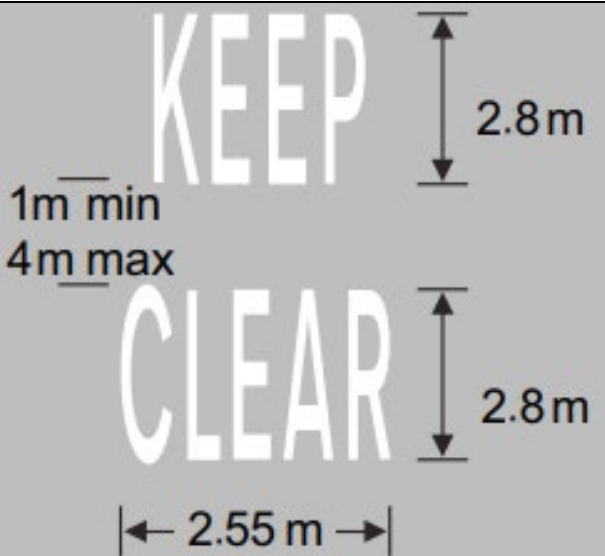


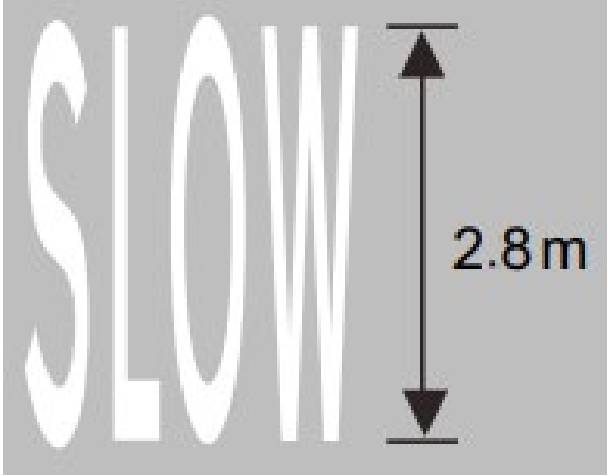
Figure C.2: Yellow globe for zebra crossings

Source: MAGLA (2016, p. 375)

Figure C.3: Road marking dimensions

	Line Code	Road Marking
Longitudinal Markers	L-1	 Length = minimum stopping distance = 22m Use: Edge, lane line prohibiting lane change/ overtaking. Location: Near intersections and crosswalks.
	L-2	 Use: Lane Lines Location: Throughout the hub where safe overtaking can be facilitated.
	L-3	 Use: Continuity Lines Location: Directly after line type 1, which can later transition into type 2.
Transverse Markers	T-1	 Use: “Stop” line Location: Placed in conjunction with stop signs at all intersections.
	T-2	 Use: “Give Way” lines to enforce road user preference Location: Placed 1m from pedestrian crossing.

	T-3	 Use: Zebra Crossing/ Continental Crosswalks Location: At all crosswalk zones throughout Curepe.
	T-4	 Use: “Yellow Box Marking” to enforce clear zones. Location: At EMR and Riverside Road junction.
Advisory Markers	A-1	 Use: “Keep Clear” marking to enforce clear zones for queuing vehicles. Location: Near taxi zones, allowing a clear lane for overtaking vehicles along Evans Street.

	A-2	 Use: “Slow” marking added as an additional warning sign to warn drivers of hazard. Location: Before crosswalk along the EMR and PBR.
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Source: Adapted from Department for Transport (2021)

For shade and curbside appeal		
		
For shade and to provide food for the pedestrians and socially displaced		
		

Figure C.4: Local greenscape tree suggestions



Figure C.5: Conceptual images for greenscape design

Source: Image (a) VirtualExpo Group (2017); Image (b) Grubb (2020); Image (c) Atlas (2009); Image (d) (Kuntzman 2008); Image (e) Vance (2015); Image (f) New York City DOT (n.d.)